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COMMUNICATIONS

AN UNPIGMENTED PRIMARY TUMOUR OF THE OPTIC DISC*

(A contribution to the knowledge of the Phakomata of the Eye)

BY

J. PENDLETON WHITE *and* ARNOLD LOEWENSTEIN

GLASGOW PRAGUE AND GLASGOW

PRIMARY tumours of the optic disc are generally rare. They provide the clinician with difficulties, and the diagnosis is not an easy one. It is necessary to distinguish the growth from an inflammatory manifestation and from a congenital anomaly. Then the question arises as to whether the growing tissue is a benign or a malignant growth. The answer to this question is often so impossible that our uncertainty leads us to the decision to excise the affected eye, even when its function is still preserved. Even then, when we are in a position to study the growth histologically, our ignorance of the cellular structure of these blastomata is still overwhelming.

The tumours of the optic disc are especially interesting from the general pathological point of view. The blastomic character of this growing tissue is mostly unrecognisable in the cases of phakomata.

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We find tumours of the disc in Bourneville's tuberous sclerosis and in von Recklinghausen's neuro-fibromatosis. It is possible that primitive cells of the eye vesicle, which did not take part in the co-ordinated development, perhaps under the influence of an endocrine evolutionary period, start a new growth. The equilibrium of the germinal layers is disturbed at some time during the growth. Mesodermal tissues appear in neuro-ectodermal tumours. It is difficult sometimes to decide which part of the tumour is the primary growth and what is secondary tissue reaction. The growth itself may develop in a pathological way, mostly with a tendency to disintegration as in Bourneville's disease, where the retinal buds of primitive retinal cells are disintegrated and discharged as vitreous clouds. That is an instance of *regressive metamorphosis*. On the other hand, it is well known that tumours in Bourneville's disease, the neurinoma of von Recklinghausen's disease, the angioma in von Hippel-Lindau's disease, or the angioma in Sturge-Weber's, may be linked with a true blastoma (glioma). Here the growing tendency of undifferentiated embryonic cells is pathologically increased.

There are two questions of a general character which are of special interest.

(1) Is the number of ocular phakomata exhausted with the four known diseases, Bourneville's, von Recklinghausen's, von Hippel-Lindau's and Sturge-Weber's ?

(2) Is a phakoma always a multiple anomaly or is a phakomatous growth possible in one tissue only, *i.e.*, in a certain tissue of the eye, without provoking the variety of repeatedly described tissue changes in skin, brain, spleen, kidney, etc. ?

We describe here the clinical and histological data of a case which may throw some light upon these two, and perhaps some other related questions.

History of case

Family History :—The boy's parents, grandparents and other relations were all healthy, and none exhibited any signs of mental deficiency, epilepsy, blindness, glaucoma, mollusca or neurofibromata. He has four brothers and they are healthy and intelligent. The eldest brother aged eight and a half has a small ventral hernia in the xiphisternum area. He has one sister four and a half years. Her skin is rough, hard, dry and cracked on forearm and legs.

Patient :—He was first examined in a School Clinic in September, 1942, aged seven and a half years. He was referred to the clinic on account of defective vision in the left eye, and a convergent strabismus. He was an intelligent boy, well built and well nourished. Previous illnesses included measles, whooping

cough and two attacks of pneumonia in early childhood. The visual acuity of the right eye was 6/6, and that of the left with a correction of + 1·0 D.Sph. 6/36. There was no exophthalmos and no local thickening of the eyelids. Externally both eyes had a normal appearance. At the first investigation the upper two thirds of the left disc were covered by a whitish smooth mass of two disc diameters. Two and a half years later the growth had increased to about four disc diameters. Fig. 1 shows the condition of the growth at that time. The disc is covered by a greyish white mass of an oval shape with a smooth surface. The margins of the tumour are tuberous and rise steeply from the fundus (+1 D.) to a height of eight dioptres. Most of the tumour mass is not vascularised except for a small part in the lower temporal area. The nasal part of the mass is covered with haemorrhages, some fresh, some old. The tumour extends equally on the nasal and temporal sides of the disc. There is scattered pigment in the lower half of the fundus, with depigmented spots and superficial haemorrhages which may be sub-hyaloid. The pigment is predominantly in the deeper retinal layers. There is no engorgement of the vessels. There are small yellowish white patches of exudate in the fundus near the tumour. The field was full.

The lower part of the right fundus showed changes similar to those seen in the corresponding part of the left fundus. On the left side of the scalp a small lump the size of a bean, easily movable and rounded and of a hard consistency, was noted. This was regarded as a sebaceous cyst. He had a birth mark on his back (dorsal region) in the form of a small mole.

X-ray of Skull showed that the foramen opticum was slightly enlarged, but there was no calcification of pia or cortex, and no calcified angiomata. There was no difference in the size of the orbital cavities.

Slit-lamp examination of the right eye showed no abnormality of the corneal nerves and no nodules in the iris. Clinically the anterior half of the left eye showed no abnormality. As tubercular and syphilitic causes were eliminated a diagnosis of blastoma was considered. The change in size observed over a period of two and a half years was too obvious for the assumption of a congenital anomaly. Therefore the possibility of a phakoma or true blastoma was considered. Phakomata being sometimes linked with a true blastoma (glioma) it was decided after so long a period of observation to excise the eyeball. This was done in March, 1945, under a general anaesthetic, along with a piece of the optic nerve 9 mm. in length. The eyeball was fixed in ten per cent. formalin and then divided horizontally. Stereo-photo (Fig. 2) shows the extent of the tumour. It measures in its greatest horizontal diameter 10 mm. and is 4 mm. in thickness. One half of the globe was

embedded in celloidin, while the other half was kept in gelatine for frozen sections.

The cornea and angle of the anterior chamber are perfectly normal and the ligamentum pectinatum well developed. The iris tissue shows a denser pigmented area at its surface towards the pupillary margin. There is an eversion of the pigmented layer of the iris.

The great mass of the tumour consists of a spongy tissue with large cells, the plasma of which is clear and swollen. The nerve fibres in front of the cribriform plate show a system of spaces of different sizes (Fig. 3). Many of the larger ones are divided by fine fibres. Some of these spaces are empty, others display a very delicate honeycomb pattern resembling Coats' ghost cells (Fig. 4, A and B). It is a foamy structure in celloidin sections. The main mass of the tumour is built up of the same cells, some in a fairly good state of preservation (Fig. 5).

Many of these cells have no nucleus. In others the nucleus is pressed against the wall, and appears flattened. In some the nuclei are well stained and of a round shape, varying in size and with a similar appearance to xanthomatous cells. The retina is not pushed aside as in papilloedema, but is infiltrated by the growth, and has lost its characteristic structure. The nuclei of the outer nuclear layer are only recognisable at the temporal and nasal margins, but even here the nuclei are scattered in an irregular manner and their arrangement is interrupted by huge foamy cells. There is no trace of rods or cones in the area corresponding to the growth. About 1·5 mm. from the margins of the disc the retinal structure becomes recognisable. The foamy cell mass invades all the retinal layers equally. On the temporal side a regular foam cell tissue infiltrates into Henle's fibre layer, and here the neuro-epithelium is well preserved. Within the peri-macular ganglion cell masses there are many ganglion cells, three to four times their normal size, outstanding on account of their larger and lighter coloured nucleus and the paler cytoplasm. These ganglion cells are absent on the temporal side of the macular area. The infiltration of the retina occurs similarly towards the nasal side. Here the retina shows eosin-red exudates in the inner nuclear and the outer granular layers as in hypertensive retinopathy.

A remarkable cavernous structure restricted to the nasal half of the optic nerve begins about 4 mm. behind the lamina cribrosa and occupies an area of about 3 mm. (Fig. 6). It does not reach the end of the optic nerve in the specimen. This appears normal. The cavernous changes have no relation to the vessels, which are normal. The arachnoidal sheath is thicker than normal and the endothelial cells are increased in number.

The choroid is somewhat thickened, the thin-walled vessels being

FIG. 1.

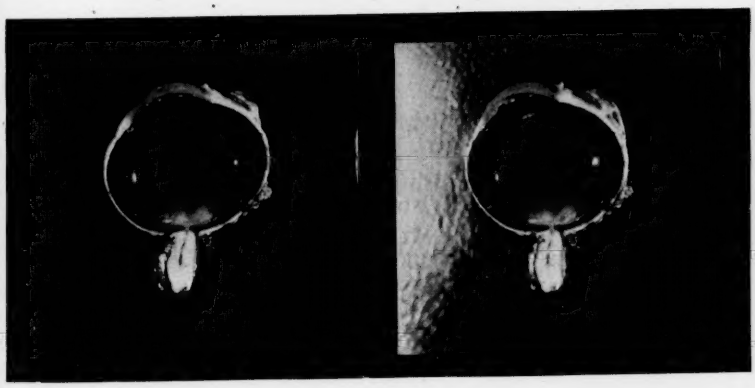

FIG. 2.

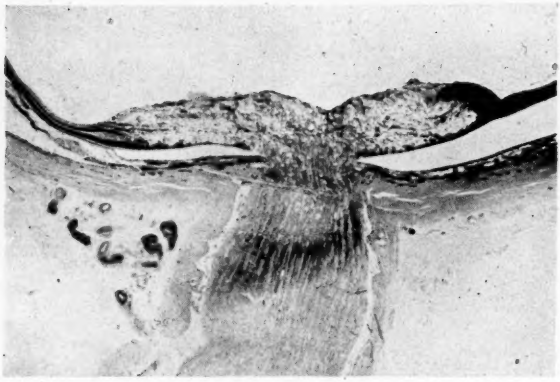

FIG. 3.

Surview of the infiltrated disc. Low power view of the tumour.

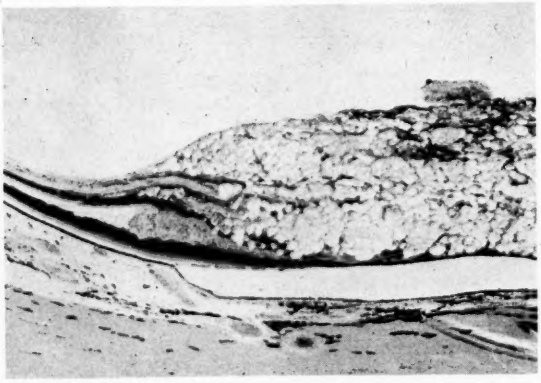

FIG. 4A.

Nasal part of the tumour infiltrating all retinal layers.

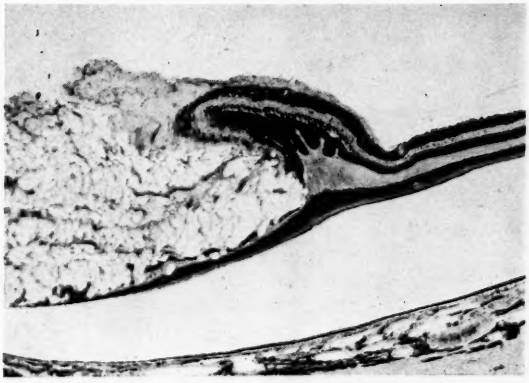

FIG. 4B.

Temporal part of the tumour.

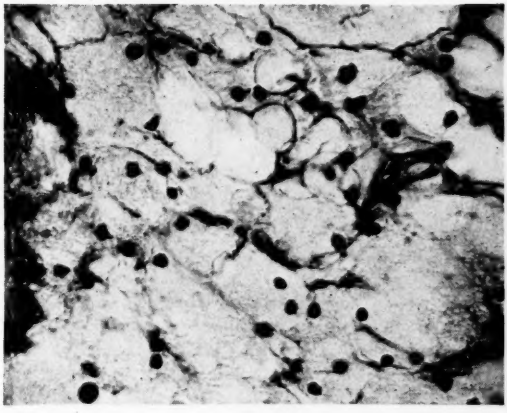

FIG. 5.

Cell groups of the temporal part of the tumour.

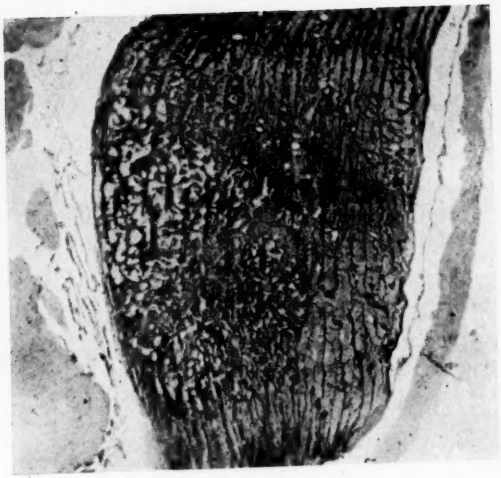

FIG. 6

Cavernous degeneration of the optic nerve.

wide, and many entirely empty and not collapsed. There is no nerve fibre growth.

Mallory staining shows that all the holes are situated in the nerve fibre and retinal tissue exclusively, and not in the mesodermal part. Silver staining for reticulum does not show up any reticulin in the holes. The reticulum content between the tumour cells is moderate. There is a sub-hyaloid haemorrhage in front of the nasal part of the tumour. There is very little tumour tissue at the disc in the part of the eye embedded in gelatine. The few tumour cells found do not show any fat staining. The holes in the cavernous part of the optic nerve are fat free. Muco-carmin staining does not reveal the presence of mucin.

Studies of the retina in bulk unstained showed that a film of blood and fibrin was closely adherent to the retina even in the periphery. The choroid in bulk showed circle-shaped defects in the pigmented epithelium. These punched out defects were present in considerable numbers. We cannot rule out the possibility of an artefact.

Discussion

This tumour cannot be considered as a blastoma in spite of the fact that its growth was observed clinically. We consider the case as a phakoma (van der Hoeve, 1921), a malformation resembling a new growth developing from undifferentiated embryonic neuro-ectodermal cells which normally would grow into glial and ganglion cells, and have become misplaced or abnormal in quantity.

Clinically the case here described showed great similarity with Stallard's case (1938), in which a greyish hemispherical nodular mass covered the disc with flecks of exudate in the retina adjacent to the disc. This (Stallard's) tumour infiltrates the disc and the retina and shows small cysts and areas of hyaline degeneration. A wedge is driven between the nuclear layers. The rods and cones are degenerated beyond the tumour limits. There are exudates in the outer molecular layer. Swollen cells arranged in clumps have a slightly granular plasm and eccentric nucleus. There were mental disturbances, ataxia, and disturbance of the auditory nerve.

This case of Stallard's belonged to a family affected with von Recklinghausen's disease in two generations, and showed signs of phakoma in other parts.

The diagnosis of a Recklinghausen intra-ocular tumour is easier when plexiform neuro-fibromatosis of the lid is visible as in Davie's case (1939), which was associated with glioma. In this case degenerated nerve fibres were found somewhat jellified, and parts of the nerve were in a state of almost complete liquefaction.

Our case shows a high degree of disintegration of the tumour

cells. Regressive processes seem to be the feature in these misplaced cells, as in Bourneville's disease, where cystic arrangement of the primitive retinal cells and their cloudy dissolution are essential features. (Loewenstein and Steel, 1941). Van der Hoeve (1936) regarded syringo-myelia as a form of phakoma. The regressive process here is an important feature of the phakoma.

Robson, Blackwood and Cookson (1941) described a case of neuro-fibromatosis of the choroid, which showed a growth of predominantly myelinated nerve fibres and bi-polar cells with ovoid bodies consisting of neurofibrils. In this case the blastoma character is apparent.

The variety of cellular changes in neuro fibromatosis is very marked according to Percival Bailey (1932). He found even pseudo-xanthomatous cells. The cavernous structure may result from their presence.

We do not doubt the phakomatous nature of our case, but it does not correspond to any of the forms so far described. It resembles most the Recklinghausen tumour described by Stallard. The cells, however, forming our tumour are different and do not suggest an origin from nerve fibres. Loewenstein (1945) has described a growing melanotic tumour of the disc which infiltrated optic nerve, retina and choroid. The depigmented slide revealed a naevus cell character. There were aberrant nerve fibre bundles running behind the retina. Neuro-epithelium was not developed in the area of the nerve fibre malformation.

We think that Loewenstein's case and our new one may be explained in a parallel manner. The optic stalk as far as invagination extends consists of the two layers of the secondary cup. The outer one corresponds to the later hexagonal layer. The outer layer of the optic stalk shows no sign of pigmentation in man, and disappears according to Juler and Ida Mann (1922) entirely; taking part possibly in the formation of neuroglia or blending with and becoming lost in the sheath of the nerve. There are a few exceptions only in which the outer layer of the stalk is pigmented, that is in the embryo of the bat, the sheep and the chicken, but this pigment disappears again in the course of further development. It is not known whether this pigment exists for a restricted period in the optic nerve. Clinical experience tells us that the disc of the new-born is of a greyish colour due seemingly to a pigmentation which vanishes later. George Coats (1909) found that the hexagonal cells stop sharply at the optic nerve, and that there is no transitional stage between pigmented epithelium and neuroglial frame work of the nerve. He described a pathological case which exhibited a deep pocket at the edge of the nerve entrance lined partly with pigmented and partly with unpigmented epithelium. Further up the nerve little patches of retina and

pigmented epithelium were discovered, these being completely isolated and surrounded by tissue of the optic nerve. These pigmented patches were present in both optic nerves of an anancephalic child.

Another finding, that of Juler and Mann (1922), proved that pigmented epithelium ran round the edges of the scleral foramen continuously from the bulb along the optic nerve. This pigmented epithelium was normal at many places lining the optic nerve. At others it penetrated the adjacent tissue towards the interior of the optic nerve.

These two cases show a high degree of misplacement of cells of the outer layer of the secondary cup in the area of the optic nerve. George Coats had already stressed in 1909 this frequent metaplastic development in congenitally abnormal eyes.

The majority of these misplaced embryonic tissues disappear during development. Some cells may escape conversion into neuroglial structures. They may act as an obstacle for the outgoing nerve fibres which ought to find their way from the retina into the optic stalk, and so cause the aberration of some bundles as in Loewenstein's case. On the other hand these misplaced and preserved embryonic cells may be the focus of the later phakomatous formation. The phakoma caused by the implantation of the embryonic cells from the outer layer of the cup may produce a pigmented phakoma (Loewenstein's case), that from the inner layer an unpigmented growth (our case).

Summary

A case of unpigmented tumour of the disc is described in a nine year old boy, its growth having been observed over a period of two and a half years. Histological investigation showed a tissue consisting of large foamy cells, the contents of which were neither fatty nor mucinous. The nature of the regressive process was not determined.

The tumour tissue infiltrated the surrounding retina, the posterior layers of which were missing and were perhaps undeveloped. There was a cavernous degeneration in a large part of the optic nerve. The caverns were empty or filled with a fine foamy substance. A film of sub-hyaloid blood covered wide areas of the retina. The growth is explained as a phakoma arising from the neuro-ectodermal cells of the optic stalk, into which the fibres of the retinal ganglion cells grow. As the two layers of the optic stalk consist of potentially pigment producing cells (the outer layer) and non-pigmented ones (the inner layer), misplacement of either of them may be responsible for the growth of a pigmented or non-pigmented phakoma of the disc. The existence of both malformations can be proved.

We desire to thank Professor W. J. B. Riddell for kindly placing the facilities of the Tennant Institute at our disposal, and also Mr. John Watt for his technical assistance.

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CONJUNCTIVAL HAEMORRHAGE DUE TO AN INFECTION OF NEWCASTLE VIRUS OF FOWLS IN MAN*

(Laboratory and Contact Infection)

BY

N. I. SHIMKIN

HAIFA, PALESTINE

IN the ophthalmic literature, no case of haemorrhagic conjunctivitis due to the Newcastle virus of fowls, has been mentioned up to the present date as occurring in man.

As is known, this Newcastle virus disease causes a 90-100 per cent. mortality in fowls. The disease got its name from the City of Newcastle-on-Tyne, England, where it first appeared in 1926, and was described in detail by Doyle in 1927. He proved that this epidemic was caused by a filter-passing virus which, as proved also by others, was fatal to fowls even in the dilution of 10^6.

This disease of fowls is widely spread in the East, but has been observed in the West, *viz.*, in England, only twice, in 1926 and 1933.

In Palestine, the disease first appeared in 1937, and was described by A. Komarov, D.V.M., Government of Palestine Poultry Diseases Officer, Northern District; it re-appeared in 1945.

A case of laboratory infection in man caused by Newcastle virus

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was observed by the author of this article in Haifa at the end of 1945, and was demonstrated by him at the Meeting of the Haifa Ophthalmological Society on January 2, 1946.

The case

On December 11, 1945, Miss L. G., aged 23 years, an Assistant of Dr. A. Komarov, at the Government Laboratory, Poultry Diseases Offices, Northern District, Palestine, consulted me, and gave this history. On December 7, she was injecting poultry for protective vaccination with amniotic fluid from a chicken egg (dilution 1 :3,000). During the work she touched the upper eyelid of the left eye with her forefinger. On the following day the lid became reddish, and the redness increased still further. She applied 2 per cent. boracic lotion, and continued working. On December 11, she came complaining of a slight soreness and a great redness of the left eye. She informed me that, on the same day, an orderly helping her had also touched his eye, but had washed the fluid off carefully. He was seen by the author on December 12, but no signs of any reaction were observed.

On Examination :—The left upper eye-lid was slightly proptosed and the skin slightly oedematous. Along the whole length of the eyelid a dark blue strip of subcutaneous haemorrhage, 2-3 mm. broad, was observed; and, on raising the upper lid, a heavy subconjunctival haemorrhage covering the upper and outer part of the conjunctival sclera was seen. No discharge was observed. All pupillary reactions were normal, as well as all movements of the eyeball. *Vision* : right and left eye, 6/6. Fundus oculi normal. The patient was sent home with drops (zinc sulph. 0·02, cocaini muriatici 0·10, adrenalini hydrochlorici 10 guttae, aqua distillata 10·0).

Differential Diagnosis :—In this case, it was natural to suspect a severe blow as the cause of the subcutaneous and subconjunctival haemorrhage, but this was not so. The age and the general health of the patient were proof of absence of subconjunctival haemorrhage due to a sclerosis of the vessels. The absence of discharge and any inflammatory symptoms, normal conjunctiva in places which were not covered with haemorrhage, and of any bacteriological findings, militated against diagnosing the case as an acute haemorrhagic conjunctivitis of Koch-Weeks origin. This disease occurs sporadically in Palestine in winter time, and causes epidemics in the hot and dry seasons (Shimkin).

The patient came for a second examination 3 days later. The subcutaneous and subconjunctival haemorrhage had begun to be absorbed. This process continued until January 2, 1946, when the patient was demonstrated to the Ophthalmological Society of Haifa.

At the meeting, when the patient was seen by eye surgeons, a very narrow strip of haemorrhage still remained on the outer part of the limbus. The Secretary of the Society, Dr. Faig, mentioned that he had just seen, in his private practice, a similar case of subconjunctival haemorrhage, without any signs of inflammation, in a woman, and had not suspected that the cause might be attributed to the Newcastle virus. Dr. A. Komarov, D.V.M., M.Sc., suggested asking Dr. Faig's patient whether she had, a few days earlier, prepared for cooking a fowl bought in the market. This later proved to be the case.

Review of Literature

A large literature on the subject of the Newcastle virus of fowls, from the first outbreak in 1926 up to the beginning of 1943, with 77 references, was collected and carefully studied by F. R. Beaudette, D.V.M.; it includes no mention of contagiousness for man.

The first case of human laboratory infection was published by F. M. Burnet, at the end of 1943. No original of that article being on hand, the following extract from the Veterinary Bulletin of 1944, number 14, pp. 300-301), kindly sent to the author of this article by Dr. Gur, V.M.D., Government of Palestine Poultry Diseases Offices, Southern District, is given below:—

"A case is reported of infection in a human being with the virus of Newcastle disease of fowls. The source of the infection was the accidental squirting of a large inoculum of highly infectious allantoic fluid from an experimentally infected egg. An acute conjunctivitis developed and persisted for one week, during which local treatment was applied. The virus was isolated from the discharge from the eye, and anti-body response was demonstrated by means of the Hirst technique."

As is shown in the Veterinary Medical literature (Beaudette) it is well known that the Newcastle virus acts by attacking the blood system of poultry. In post-mortems of diseased fowls, the changes in the vessels are very pronounced, particularly in those of the mucous and serous membranes, as well as in the subcutaneous tissues and muscles, and all inner organs. Thus the compact subconjunctival and subcutaneous haemorrhages of the eye-lid may be taken for acute conjunctivitis by medical men not experienced in eye diseases.

In Palestine a small epidemic of contact infection by Newcastle virus occurred at the Agricultural School, Mikveh-Israel, where there was an outbreak of Newcastle epidemics of poultry; these cases were first reported by Dr. Yatom, Mikveh-Israel, in February, 1946.

"The cases, mostly women, kitchen personnel engaged in preparing poultry for the table, were confined to individuals who had

come in contact with chickens from a chicken run infected with Newcastle disease. There were 17 cases, 3 men and 14 women, aged 13-70 years." (Personal communication.)

The cause of this kitchen outbreak is that the Newcastle virus is contained in all the parts and tissues of the body of fowls; in secretions and excrements; in saliva, faeces, liver, spleen, lungs, pancreas, egg-yolk, testes, intestines, bile, crop contents, and especially in the brain and cord, where the concentration of virus is very great; the virus is also present in the blood and pericardium. All this readily explains the infections of people who had touched diseased fowls, while preparing them for cooking. It is surprising that the number of patients was so few. Dr. Yatom considered that the clinical picture was reminiscent of the conjunctivitis epidemic in Palestine; but it was distinguished by its confinement to one eye only, and without the involvement of the cornea. This last fact may be easily explained in that the virus attacks blood-vessels, and these are absent from the cornea.

This outbreak stopped abruptly after the infected poultry had been destroyed. The incubation period in 3 male and 14 female cases lasted 3-4 days. All the symptoms disappeared after 10-14 days. There was no case of contact infection from man to man (from wife to husband or her children).

Summary

1. A case of conjunctival haemorrhage in man, due to Newcastle virus infection of fowls, is described.

2. This conjunctival haemorrhage in man can be caused by laboratory experiments, or by contact with infected poultry.

3. The disease, up till now, was observed only in one eye of each patient; the incubation period is 3-4 days, and all the symptoms disappear in 7-14 days, without any later complications.

4. The action of Newcastle virus in fowls is to attack the walls of the blood vessels; the haemorrhage in man is due to the action of the virus on the conjunctival vessels.

5. This condition may be called haemorrhagia subconjunctivalis and subcutanea of man, due to infection of Newcastle virus.

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HISTORY OF OPHTHALMOLOGY THROUGH THE AGES*†

BY

J. R. WHEELER

BELFAST

TODAY, as the result of war, we are living in one of those crises of history which cause a great social upheaval in human society. Steady peaceful progress is replaced by a sudden jerk forward and, as a result, we must adapt ourselves to the new environment.

The future position of our profession in its relationship to the State is being examined by our legislative authorities, and so it behoves us (the present holders of our birthright) to be certain that the public, and we ourselves, have our views clearly set out.

That great statesman, Winston Churchill, recently remarked, "The longer you can look back the further you can look forward." And so to-day I propose to trace the history of ophthalmology from the earliest times, race you through the middle ages and so up to the present day. I will endeavour to pick out the chief actors and emphasise the part they played in unravelling the history of about 4,200 years.

The uncertainties of unrecorded history make it impossible to say where the dawn of civilisation began, but the earliest mention of any medical matter is found in an ancient work on law. About 2250 B.C. Hammurabi—a king of Babylon-Assyria—promulgated a collection of laws. A considerable number of sections of these laws relate to ophthalmology—or rather to ophthalmic negligence or malpractice—*e.g.*, one such law states that:—

(196). If a man destroy the eye of another man, they shall destroy his eye. (In the case of a freeman he shall pay one manna of silver and, in the case of a slave he shall pay one half his price.)

Another states:—

(215). If a physician open an abscess in a man's eye with a

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† Address at the opening of the Winter Session at the Royal Victoria Hospital, Belfast, on October 10, 1945.

bronze lancet and save that man's eye, he shall receive ten shekels of silver—if the eye is destroyed they shall cut off his fingers—if a slave's eye is destroyed he shall pay one half the price of the slave.

This age is obviously the bronze age as bronze instruments were being used.

The practice of medicine and surgery of these times was almost wholly in the hands of priests and was mixed with the greatest superstition and magic. Apparently no patient was treated without the appropriate magic incantation being duly recited.

The scene now changes from Babylon 2250 B.C. to Egypt 1650 B.C. A priceless document was found between the legs of a common mummy at Thebes and purchased by the Egyptologist Ebers from an Arab.

This Papyrus Ebers, as it was called, consisted of 110 pages or columns and describes all the diseases and remedies that were known to the Egyptians of that time. Of these 110 columns, eight are devoted exclusively to diseases of the eye and treatment is advised for such troubles as pain in eye, tear in eye, pus in eye, blood in eye, turning of eye, dimness of sight, etc. Common medicaments employed were: onions, leeks and beans, castor oil, pomegranate, copper salts, oxymel of squill, hemlock and opium.

In these days of ancient Egypt all learning of the times was imparted in the temple school and so, priests were doctors, and doctors priests. Anatomical knowledge was generally poor which is somewhat extraordinary when one remembers that an essential portion of the religion of the time was embalming of all bodies, both rich and poor.

These Egyptian doctors did, however, practise inspection, palpation, percussion and auscultation if even in a rudimentary way; while some of their public health laws were excellent.

In Homeric times there were many gods of healing but Aesculapius was greatest of all. Many Aescupalian temples were built which were half temple and half hospital. They were served by priests who gave medical and surgical instruction. Possibly the subtle art of suggestion, to patients previously rendered highly liable to suggestion, by want of food and drugs, was often practised by them.

In 460 B.C., in the golden age of Greece, Hippocrates was born and had as contemporaries many great and immortal men such as Socrates and Thucydides. To Hippocrates, who is usually referred to as the Father of Medicine, we ascribe the oath which bears his name and the many writings which are said to be his. It is almost certain that the oath was in use before his time, and also that all these writings were not those of Hipprocrates the Great. Nevertheless, the title " The Hippocratic Art " is well justified because

Hippocrates completed the separation of scientific medicine from temple practice and magic. He introduced into medicine the science of observation and inductive reasoning. Finally he taught that " The physician is a servant, not a teacher of Nature "—do enough but never too much.

What Hippocrates failed to understand was that there were various sorts of disease—his crude pathology made treatment a question of influencing his four cardinal humours (blood, mucous, yellow bile and black bile). This was attempted by restrictions in diet, hot foot baths, irritant gargles, cupping, venesection, the cauterising of blood vessels in the neighbourhood, multiple incisions down to bone and even trephining of skull.

In the treatment of ocular affections the acute variety were treated by venesection and cupping, with local counter-irritation, at some remote distance, to draw the humours away from the eye. The chronic affections were treated mainly with local application of milk of women, and gall of goats, but various preparations of copper, iron and lead were also used.

Greek medicine was practised not only in Greece but extended also to Alexandria and Rome—this period extends from the time of Hippocrates to the end of the fruitful era of the Roman Empire (about 800 years).

The Alexandrian school introduced collyria for treatment of eye diseases. The collyrium was a solid medication (not a liquid) containing multiple secret ingredients made up in a cake, the basis being gum. Seals or stamps used to imprint inventor's name, ingredients, etc., on the collyrium have been recovered in large numbers. A fragment of cake was dissolved in water, oil, milk of women, urine, bile or saliva before use.

The disease which was such a scourge to eyes was trachoma—it has been described as, as old as the Nile and the desert, and certainly caused tremendous suffering and much blindness.

Three famous men's work was accomplished in this period of Greek medicine—Celsus, Pliny, Galen. Celsus of the Alexandrian School wrote " De Medica " in A.D. 29. It is mainly a compilation but written in excellent Latin. Out of a historical void he gives a detailed description of couching for cataract. The name cataract was adopted later by Constantinus Africanus—the Greek name was " hypochyma " and the Latin " suffusion." The names all express the humoural implication—in " suffusio corrupt " the humour was supposed to collect in a space between the pupil and the lens—thus obstructing visual spirits. When suffusio was fully formed it could be displaced into a part of the eye rather than in front of the lens by means of an operation. Operation consisted of entering a sharp strong needle into the eye and gently working the suffusio away from the pupil.

Roman writers of this period were interested in the problem of why the pupil is black. Pliny made the observation that the eyes of nocturnal animals were brilliant in the dark; but the fact that no animal radiates light it has not received was not appreciated for many years to come.

Galen (A.D. 131-201).—Next to Hippocrates this old Roman master of medicine has been called the greatest of all physicians. Unfortunately his books on optics and diseases of the eye have been lost in the tide of time. He did, however, add to the knowledge of the anatomy of the eye. He declared Nature created nothing defective and nothing in vain. He describes the eye as the most divine of organs and admires the wisdom of the creator who took such care of brain and retina. Like Hippocrates he thought the crystalline body (lens) to be the essential organ of vision (and his ideas on cataract were the same as Celsus). He believed the function of the retina was to perceive the alterations which occur in the crystalline body and to communicate them. He used hyoscyamus to dilate the pupils for cosmetic purposes.

It is interesting to note that in this era Julius Caesar raised the status of physicians who were permanent residents in Rome by granting them citizenship. These physicians were mainly Greeks or slaves as the better class Roman only took up legal or administrative posts.

The Arabian Period (A.D. 850-1375).—About 630 A.D. there appeared the Prophet Mahomed. By 1050 the Turks under the banner of Allah began a reign of conquest and Christian persecution in the then known world of the Eastern Mediterranean. One unfortunate result of this was the burning of the famous library at Alexandria; this has created a gap in these ancient writings which can never be refilled. The Arabians did, however, translate some Greek writings into Syriac and later into Arabic. Unfortunately they revered the authority of tradition and did not learn the crowning wisdom that fact is greater than dogma. And so, alas, many mistakes were perpetrated in these translations.

The crusades against the banner of Islam (1096-1272) had one advantage that as a result of travel some Eastern learning began to filter West.

Before decay overtook the Arabian Renaissance the torch had been handed on to Western Europe by the translations into Latin from the Arabic version of the Greek masters. Also, at this time we have the work of an Arabian genius Alhazen whose "Optics" were the earliest basis of our present science.

Interlocking with the Arabian era there began a period of systematised intellectual effort in the schools of Salerno and Montpellier.

The famous monk Constantinius Africanus translated Arabic

writings into Latin and thus began a movement which gathered speed with years. Later Benevenutus Grassus wrote a book giving a good summary of Greek and Arabic teaching. It is important historically as it is the only book of its kind which was translated into many different languages.

In this era there appeared an interesting treatise on the hygiene of the eye by one, Peter the Spaniard, who later became Pope John XXI.

The conception of contagiosity of ophthalmia was offered by John Yperman.

It is hard to say exactly when the genius of man discovered the fact that glasses relieve the ocular defects of nature. In the days of the Roman Empire short sight diminished the market value of a slave. The old Roman patrician's only means of overcoming his presbyopia was to make a slave read to him.

The observation that segments of spheres can be used as magnifying glasses was not original to Roger Bacon but this English monk, physicist, mathematician and philosopher was the first person to recognise clearly the use of lenses for old people, and for those with weak sight. In 1268 Roger Bacon in his " Opus Magnus' treats on the science of optics in general and lenses in particular. He recommends the use of a plain convex lens, with the thickness smaller than the radius, as an aid for seeing for the old. Such lenses were to be used resting on the page to magnify the text.

Bacon had shortly afterwards to flee before Papal wrath but before doing so he probably passed his ideas on (indirectly) to Alexander de Spina—a Dominican monk at Pisa. The latter is generally accepted as the inventor of spectacles.

The existence of rock glass was known from the earliest times but the evolution of spectacles parallels the evolution of civilisation.

There is no doubt that rock crystals were probably used by prehistoric man to make tools and as a burning glass. Placed opposite the sun's rays the crystal is a most useful contrivance to produce heat and as a remedial agent for cauterising the human body. The ancient Egyptians, Greeks and Romans knew well the art of polishing rock crystals.

There is a common belief that glass making and spectacles came from China but this is not so. There are records of Confucius (B.C. 551-479) and earlier Chinese writers containing various stories to which claims are attached. It is more probable that glass making and spectacles were introduced into China via India by trading Israelites coming from highly advanced nations settled along the Mediterranean.

Pliny, the historian (A.D. 23-79) credits the discovery of glass making to the Phoenicians who rested their cooking pots on blocks

of natron (subcarbonate of soda). The heat of their fire fused this alkali with the sand of the shore to produce glass.

Amongst the earliest existing examples of glass is a small lion's head of opaque blue glass of very fine colour. The example is in the British Museum and is of Egyptian origin dating to about 2500 B.C. Records of Assyrians in the Near East about that time give a detailed process for making glass and also the actual materials used.

The glass of these early periods was used for decorative purposes or objects of art—remains of window panes were found in the ruins of Pompeii as were also some convex lenses with very short focal lengths.

It has long been established that primitive tribes devised light protective goggles before contact with civilisation. The Eskimos have long used wooden goggles hollowed out to fit over the eyes, and held in place with string or a leather thong tied round the head. Small horizontal slits served to admit the minimum of light while the back of the wood was blackened with smoke, black paint or graphite.

For centuries, masks were devised for treating squints, forcing the faulty eye to assume a normal position in looking through a small aperture. Coloured glasses were made in the latter half of the 16th century, chiefly green, blue or smoked glasses, or amber lenses, etc.

The invention of printing in 1440 established spectacle making as an industry, as many persons now found it necessary to correct their visual errors.

The similarity of spectacle frames about this time indicates a common source of origin. In 1465 the Spectacle Makers' Guild took part in a review before the French King.

The earliest known lenses were for the correction of presbyopia, but they were first used as a hand glass. It was only later that methods were devised to support the lenses before the eyes.

It is interesting to note that men of dignity and learning were always portrayed wearing spectacles. Amongst the Chinese, frames, even without lenses, were a badge of superior social status and learning. Also the tortoise was a sacred reptile to the Chinese and, therefore, tortoise-shell rims were thought to be conducive to good fortune and long life.

The next lenses developed were for the correction of hypermetropia. It was not until the 16th century that myopic lenses came into use. Little is known as to how the power of the lenses was designated during this period, but probably the age of the wearer was the basis of classification.

The 17th century marks the beginning of a new era in progress in the optical field. In 1623 Daza de Valdes, a notary of the Inquisi-

tion at Seville, mentioned cataract lenses. In 1608 Galileo Galilei constructed his telescope on the model of Hans Lippershey of Holland, and discovered four satellites of Jupiter, demonstrating the fact that they revolved round the planet. This gave a new impetus to the lens grinding profession. During this century Newton conducted his famous experiments on the composition of light. He was the first to decompose light by prisms and recompose it again. This definite knowledge paved the way for further experiments in optical lenses and apparatus.

About the same time as the telescope was being constructed the microscope was also coming into use. A Dutchman called Leeuwenthoek was studying his " little animals " as he called them, and in 1673 first published his observation to the newly formed Royal Society in London. It is interesting to note that England was still at war with Holland at this time, and until 1674, but the historian records that the nations had been at war without being angry. Now Leeuwenthoek has been given the title of " Father of Bacteriology and Protozoology " and he was undoubtedly the first to see and describe his " little animals," but he made no attempt to carry his findings any further. The super-excellence of his lenses which he taught himself to grind, polish and mount, together with the exceptional keenness of his eye, put him at least a century ahead of all other microscopists. Surely there must have been a want of an inquisitive genius in the following age?

The theories enunciated by Galen persisted for centuries but about the year 1500 Leonardo da Vinci, the famous Italian painter who produced the " Mona Lisa," was the first to discover that the retina, and not the lens, was the essential organ of vision. He also realised the principle of the " camera obscura " as applied to the eye.

During the 16th and 17th centuries the facts of physiological optics began to be slowly accepted and one Robert Hooké first measured the minimum visual angle (the basis of our present day test types).

Clinical progress had, however, not made much headway and it was not till the beginning of the 19th century that Brisseau convinced the Academie Royal des Sciences that cataract was really an opaque lens.

It is said that Susruta of India in 3000 B.C. had described the true pathology of cataract, stating it was due to derangement of intra-ocular fluids. It is also said that this surgeon practised antiseptic surgery—fumigating his room prior to operation and insisting that hands, nails, hair and beard were kept clean.

In 1748 Daviel (France) first published his planned operation of extracting the opaque lens from the eye through the anterior chamber. It took about 100 years for this operation to be accepted as

far superior to the old operation of couching with all its resulting complications.

Daviel's principle of extracting the opaque lens from its capsule is still employed up to the present time but, of course, the technique has been much improved. To-day the intra-capsular extraction of the lens (*i.e.*, removing the lens complete with capsule) is rapidly gaining ground. It was invented by De la Faye in 1753 but it was only after 1890 when Herbert of Bombay, and Mulroney and Smith in the Punjab (all members of the Indian Medical Service) published their results that it began to be accepted.

With the intra-capsular extraction of the lens good results are brilliant but the operation is more difficult to perform and, if accidents do occur the resulting consequences are more serious.

The last great ophthalmologist to the pre-scientific era was William Mackenzie of Glasgow whose text-book on ophthalmology was the book of the day, translations being used both in Germany and France. He is credited with the earliest recognition of the fact that increased intra-ocular pressure was the essential factor in glaucoma. But the fact was noted by Richard Banister in the 17th century.

I now come to the three factors which so greatly contributed to revolutionising medicine in general, and surgery in particular.

1. Bacteriology by Pasteur. Leeuwenthoek observed yeast cells but did not appreciate that these structures were living organisms—Pasteur confirmed that putrefaction and fermentation have their origin in germs.

2. Anti-septic surgery introduced by Lister in 1869.

3. Anaesthesia. The ancients tried vinegar, mandragora and other plants, as well as ice and snow, to try to render surgery painless. In 1846 ether was first used as a general anaesthetic by Long in America, and shortly afterwards Simpson of Edinburgh introduced chloroform.

Cocaine was first used in ophthalmology in 1884 by Carl Koeller of Vienna but it had been used some years previously for nose and throat work.

Today it is difficult for us to imagine what surgery was like prior to these days. Now operations could be performed painlessly and, especially with delicate operations as on the eye, without the patient moving at the critical moment. Also, the first battle had been won against that dreadful enemy of the surgeon—sepsis.

In spite of these three major discoveries the ophthalmic surgeon had still one great nightmare (which is present even to this day), *i.e.*, sympathetic ophthalmia—an inflammatory reaction in an injured eye spreading to the non-injured eye, with resulting

loss of vision. In 1818 Wardrop noted the fact that veterinary surgeons destroy the injured eye of a horse, with lime or with a nail, so that the good eye may be saved. To-day we can prevent sympathetic ophthalmia occurring but we are unable to cure it when once it is established.

The application of the principle of the magnet in removing metallic foreign bodies from injured eyes has preserved sight in an untold number of cases. In 1842 Nicholas Meyer first removed a foreign body from inside an eye by applying a magnet to the scleral wound. Later Dickson of London and McKeown of Belfast further improved upon his technique. In 1875 Hirschberg invented the powerful electromagnet which is used to-day.

The outstanding invention of the ophthalmoscope by Herman von Helmholtz was destined to make ophthalmology the most exact of all clinical sciences. In 1851 he published his paper describing the apparatus which enabled him to do what for centuries had baffled his predecessors—view the inside of the living eye. Apparently Charles Babbage in England had done the same thing a few years previously but unfortunately had failed to publish the fact.

The great ophthalmologist of this day was Albrecht Von Graefe of Berlin (1828-1870). In this age of "clinical intuition" he took full advantage of this new ophthalmoscope by examining the interior of the eye and describing the normal and pathological pictures which were revealed to him thereby. Von Graefe laid the foundation of a scientific and practical clinical ophthalmology. It is, however, with glaucoma that his name is most frequently associated.

The term glaucoma goes back to Hippocratic time and was generally accepted to mean a greenish or bluish appearance of the eye. It was then supposed to be an affection of the lens as opposed to cataract which was a perverted humour in front of the lens. The term was probably applied loosely to all forms of blindness, other than cataract, in which the pupil changed colour.

The essential feature of glaucoma—a rise in the intra-ocular pressure—was only generally appreciated about 1840, but Von Graefe was the first man to measure clinically the ocular tension, to describe the cupping of the optic disc and the pathological changes in the visual fields.

Von Graefe noted that corneal stapyloma regressed when an iridectomy was performed, and in 1857 he described his classical operation of a broad iridectomy to relieve the congestion in cases of acute glaucoma. His pathological conceptions may not have been quite correct but his operation was to be the means of preserving much vision and the saving of untold suffering.

Since his day various operations have been devised to establish

extra-ocular drainage in order to relieve increased intra-ocular pressure, notably Lagrange's sclerectomy, Elliot's trephine and Holth's iridencleisis.

The drugs which are used to-day in the conservative treatment of glaucoma—those producing an artificial contraction of the pupil—were not discovered until 1862. In this year the miotic effect of calabar bean was noted—later eserine (1864) and pilocarpine (1874).

The fact that extracts of hyoscyamus and belladonna produce artificial dilation of the pupil had been known for centuries but it was only in 1831 that Mein isolated atropine alkaloid—(homatropine 1879).

Von Graefe is given the credit of establishing the proper clinical use of these two groups of drugs.

In this wonderful scientific age many countries produced men equal to the occasion. Sir William Bowman (Britain) was not only a distinguished ophthalmologist and scientist but he has been described as the greatest of all anatomists. De Schweinitz (U.S.A.), Fuchs (Vienna), De Wecker (France), and Donders in Holland, are names that will certainly remain in history, as will also Credé for his method of preventing ophthalmia neonatorum, and Hutchinson for his classical description of inherited syphilis.

The twentieth century opens with advantage being taken of the improvement in the microscope, which afforded greater accuracy in histological studies. In 1904 Sir John Parsons gave the world a complete monograph on "The Pathology of the Eye." The year 1911 marked the climax of 150 years' struggle to find a satisfactory clinical method of illumination of the anterior part of the living eye—Alvar Gullstrand of Uppsala, Sweden, had produced his "Slit-lamp microscope" so that one could now view the anterior structures of the eye with a high binocular magnification.

The greatest triumph of this century in ophthalmology has been a method of treating retinal detachment. Gonin, of Lausanne, published his method of closing the retinal rents and searing the loose membrane back into position by means of thermal and chemical irritants applied to punctures in the sclera. His technique has since been improved upon by Larsson, Safar and Weve, who used diathermy, and Vogt who used electrolysis.

Previous to Gonin's time all these eyes went completely blind while to-day in over 50 per cent. of cases the sight is preserved.

For over 100 years attempts had been made to regain the transparency of an opaque cornea by means of grafting. In 1922 Tudor Thomas, of Cardiff, after a long series of experiments, succeeded, the secret of his success being that he applied grafts from animals of the same species.

The intellectual supremacy of man is a result of appreciating and interpreting complex visual patterns. In many modern achieve-

ments it is frequently some optical device that contributes to the final result—without optical instruments, clinical and scientific laboratories, motion picture studios and observatories, etc., would be almost helpless.

Prior to the 18th century the use of glasses was unnecessary to the majority of individuals as the ability to read or write was the possession of the learned few, and the costliness of the glasses made them prohibitive to the average individual.

Astigmatism was demonstrated by Young in 1801, and in 1827 Airy designed suitable cylindrical lenses.

A trial case of lenses was arranged in 1843 while test types were devised by Jaeger in 1854.

For a long period the art of fine optical glass making was shrouded in secrecy and passed along from father to son.

The main constituent of optical glass is sand or silica. Sand makes up 12 per cent. of the earth's crust yet only a few known deposits will furnish a quality suitable for optical glass. In general this glass contains about 70 per cent. sand, 11-13 per cent. calcium oxide of lime, 14-16 per cent. sodium oxide or soda with a small percentage of potassium, borax, antimony and arsenic to aid in improving quality. The raw materials are united by fusion or melting at relatively high temperatures in special crucibles made of burnt clay. In order to obtain the high standard of optical glass to which we are accustomed to-day an accurate control over the entire manufacturing process must be maintained.

It is over 50 years since the first attempt was made to make a contact lens, *i.e.*, a lens which fits between the lids in actual contact with the eyeball. The idea is to abolish a faulty corneal refracting surface by substituting an accurate one. In certain cases with high or difficult refractive errors the visual improvement to the patient is tremendous. The great difficulty, however, is for the patient to tolerate a glass in contact with the eye for any length of time but by the modern method of obtaining an accurately fitting glass this tolerance time factor is being extended.

The last decade has seen our pharmacopeoa re-written by the introduction of the sulphonamides and penicillin. The former made possible a great advance in the treatment of trachoma, and in the cure of ophthalmia neonatorum. Penicillin has demonstrated its wonderful power in external eye infections, and ocular wounds, but up to date has been disappointing in deep intra-ocular infections. It is too early, however, to arrive at definite conclusions.

To-day the members of the Staff of this Hospital are helping to plan a new Health Service for the nation in general and for our own Medical School in particular.

Our prayer is that we may be enabled to " think clearly " as it is only by clear thinking that real progress can be achieved.

The practice of medicine has now become so complex it is essential that all branches combine to pool their knowledge in order to obtain the best results.

With this end in view it has been decided that there should be established in Belfast a large out-patient or diagnostic block attached to the main hospital which will be common to all units. Here a free interchange of knowledge between various departments will be readily available.

When it comes to rendering special in-patient treatment and further research each unit will have its own pavilion or hospital within the colony where this work can be carried out.

This should ensure more adequate material and better facilities for the teaching of, not only undergraduates, but also post-graduates.

But when our new organisation is completed will we be in Utopia? That depends as always on us as individuals.

In the highly scientific age of the last century perhaps the machine has had more attention than the man—perhaps disease has had more attention than the patient. Let us remember that the microscope does not observe nor do our books think.

The reputation of a medical school will depend not so much on its hospital and laboratories as upon the character and ability of both its students and teachers.

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BITEMPORAL HEMIANOPIA*†

BY

W. O. LODGE

HALIFAX

"If you will see a pageant truly play'd, . .
Go hence a little and I shall conduct you,
If you will mark it."
(Shakespeare. As You Like it. III.4.55).

Loss of the outer halves of the fields of vision is a defect which has an interesting background of natural history.

The amphioxus, a primitive vertebrate, has pigment spots which serve for eyes, and to make a ripple in its throat, a ciliated organ which is the forerunner of the anterior lobe of the pituitary. In the sightless larva of the lamprey, a median pore at the top of the head communicates by a duct with the hypophysis. In the fish Bichir, of the Nile, the communication between the hypophysis and the mouth is still patent. Evidently, the anterior lobe of the pituitary was once an exocrine gland.

With regard to the optic chiasma, total decussation is the rule in the non-mammalian vertebrates. In the herring, one optic nerve passes through a hole in the other. The eyes of owls are directed forward, yet decussation is complete. In mammals a proportion of fibres are uncrossed, in accordance with the degree of frontality of vision; thus a few fibres in rabbits, about an eighth in horses, a quarter in dogs, a third in cats, and half in man are uncrossed. In the embryos of primates, the eyes swing forward early in foetal life.

If in the craniopharyngeal duct or Rathke's pouch, aberrant enamel cells or salivary acini persist, and proliferate, only the uncrossed fibres of the optic chiasma survive to tell the tale. Pituitary adenomas is yet a commoner cause of bitemporal hemianopia. Adenomas of the three main types of cell each produce distinctive syndromes. The olivary eminence is a common site for the growth of meningioma of varying grades of malignancy.

Usually the onset of bitemporal hemianopia is insidious, and unaccompanied by papilloedema. Patients seldom complain in so many words of restriction of the visual fields or volunteer other relevant information. More commonly than not, in the various pituitary syndromes, the frequency of which I estimate at 1 in

* Read on Saturday, May 26, 1945, at a meeting of the North of England Ophthalmological Society in Bradford. Microscopic sections, skiagrams and visual field charts were shown with the aid of an epidiascope.

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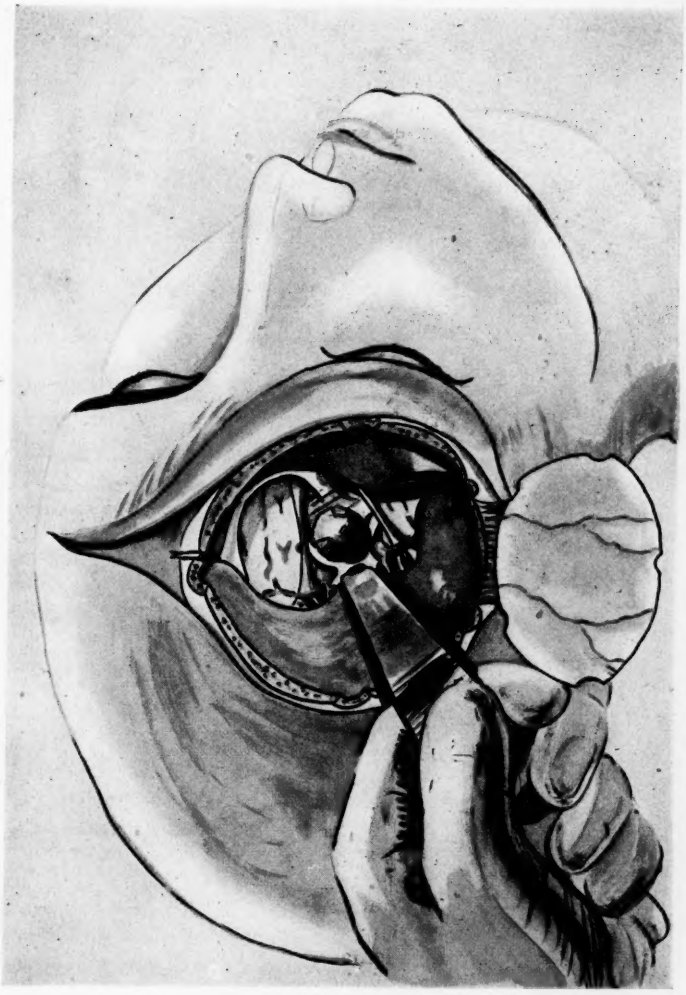

FIG. 1

Tranfrontal approach to adamantinoma. The lesser wing of the sphenoid and the falx cerebri are the rallying points.

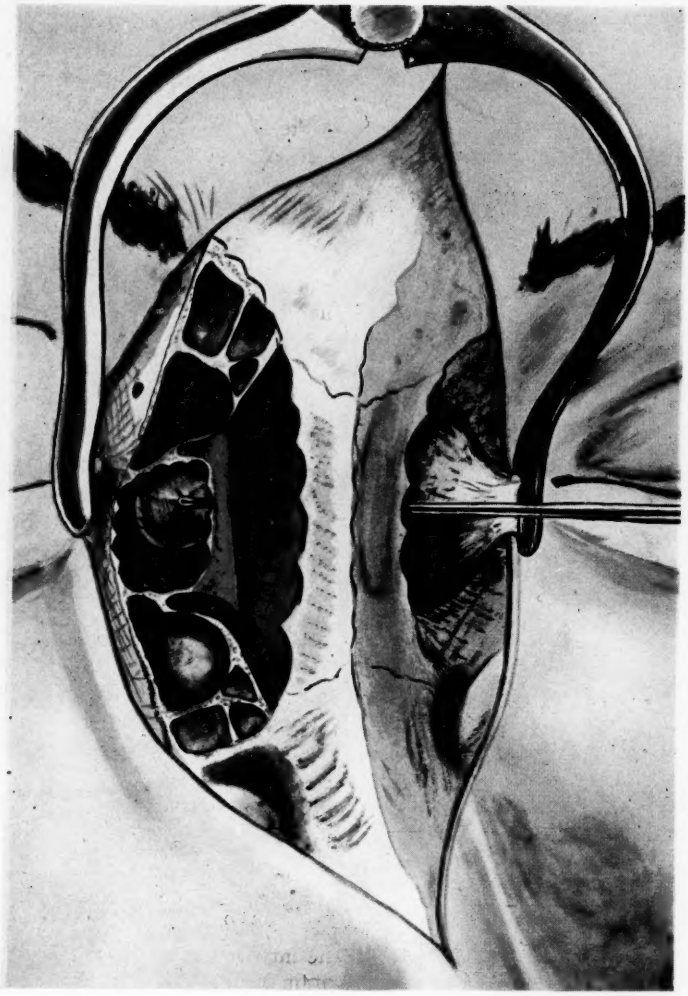

FIG. 2.

Bilateral paranasal route to intrasellar tumours. Incision between the angular veins. The ethmoidal and optic foramina bound the field of operation superiorly.

10,000 ophthalmic cases, the presenting symptom is defective vision over a long period of time. When a diagnosis has been made, and perhaps established by X-ray examination, the clinical picture is usually clear; for example, of secondary amenorrhoea due to chromophobe adenoma, of acromegaly, infantilism, basophilism or Simond's cachexia.

Pituitary facies depend mainly on skeletal changes, but it is noteworthy that the muscles of the face arise in connection with the hyoid arch and that their adaptation to expression of the emotions is more or less peculiar to the primates. Recognition of subtle changes produced by endocrine disorders should put us on our guard. Familiarity with the age incidence of the various types is helpful, though a tumour anlage may be latent for many years.

Evans and Browder in one case had occasion to split the chiasma in the sagittal plane and divide the anterior communicating artery, in order to gain access to a cystic tumour. Visual acuity of 6/12 was retained. Traquair has doubted the supposed bilateral innervation of the macula. Pressure on the chiasma concerns the post calcarine sulci rather than the eye, which may appear perfectly normal. When present, however, the hemianopic pupillary reaction is in my experience of the utmost value, because it provides objective confirmation.

Let us now consider three individual cases.

Case 1.—A case of adamantinoma

Resumé.—Eunice G., female, aged 15 years, was found to be suffering from bilateral papilloedema and Fröhlich's syndrome. Investigation led to a diagnosis of adamantinoma. The tumour was subsequently removed by a trans-frontal operation.

Eunice G., aged 15 years, was found at a routine school inspection, to be suffering from bilateral papilloedema. She was referred to the Royal Halifax Infirmary on January 19, 1945, as an emergency. The vision had been failing for eighteen months with more rapid deterioration during the past few days (? acute internal hydrocephalus), and there had been headaches and vomiting. Prior to this, she had felt well and was at the top of the class.

On examination, Eunice was adipose and infantile; menstruation had never occurred. Only the inferior nasal quadrants of the fields of vision were intact. The optic discs were swollen and oedematous and surrounded by exudate and flame-shaped haemorrhages. There were no other physical signs in the central nervous system; the Babinski reflex was planti-flexor. The Wassermann reaction was subsequently found to be negative.

X-ray examination showed an enlarged sella turcica. The posterior clinoids were missing. There was abnormal calcification within and around the sella turcica.

On January 24, after pre-medication with 1/100 atropine, 1½ grains of nembutal and 1/150 of hyoscine, anaesthesia was commenced with open ether and continued with nitrous oxide and oxygen only, through an intra-tracheal tube. The trans-frontal approach was facilitated by undeveloped frontal sinuses. After infiltration by 0·75 per cent. procain solution with adrenalin, a coronal incision was made and a temporal osteoplastic flap was reflected on the right side. Haemostasis was secured by diathermy. Before opening the dura, the lateral ventricles were emptied by cisternal puncture. The olfactory bulbs were visible, but owing to the oblique approach, it was not until the falx cerebri was defined that orientation became possible. Presently, the optic chiasma came into view. The anterior cerebral and ophthalmic arteries could be discerned. The chiasma was pre-fixed, but it was possible to elevate it sufficiently to expose the sella turcica, where a coralliform tumour with scintillating crystals embedded in it came into view (see Fig. 1) and was seized with a pair of ring forceps. As the tumour was calcified and could not be crushed, it seemed at first impossible to extricate it without severing one optic nerve, but with perseverance and a kind of "axis traction," it was eventually delivered without that sacrifice. The tumour was the size of a cherry and seemed fully to account for the defective fields of vision. No further calcification was to be seen in the region exposed; it was thought better not to probe towards the infundibulum and third ventricle. The wound was closed in layers, the bone flap being secured in position by a suture passed through special drill holes; the customary stainless steel wire sutures were in this case omitted. Blood plasma was administered intravenously.

After operation, the vision improved, and the patient recovered sufficiently to be shown at a meeting of the Leeds and West Riding Medico-Chirurgical Society, but she succumbed to recurrence of the tumour in June, 1945.

Histology

A microscopic section of the tissue removed is available. It has been decalcified and stained under the direction of Professor M. J. Stewart who reports as follows:—

"The great bulk of this tumour is densely calcified and even ossified, but enough soft tissue is present to show its true nature. It is a typical adamantinoma showing beautifully the characteristic myxoid degeneration of the rete malpighii of the squamous epithelium."

Adamantinoma or ameloblastoma usually occurs in adolescence. Appearing in the cleft between the pituitary lobes, it is of slow growth, but may resemble in behaviour basal celled carcinoma.

Case 2.—Meningioma of Olivary eminence of sphenoid. Removal. Resumption of work. Death from recurrence twelve months later

J.W., aged 35 years, core maker, was a man of short stature with somewhat leonine features and spatulate fingers. He was the father of three children, the youngest eight years of age. In August, 1941, he complained of failing vision. He had had no headaches and no vomiting.

On examination, vision in the left eye was 6/24 with complete temporal hemianopia, and acuity in the right eye was less than 6/60 owing to a central scotoma, without any peripheral hemianopia. The optic discs were normal except for slight pallor, and nothing abnormal was discovered on examination of the central nervous system.

An X-ray examination showed erosion of the posterior clinoid processes and flattening rather than expansion of the sella turcica.

The patient did not consent to operation until November, 1941. On November 19, 1941, after pre-medication with scopolamine and morphine, the scalp was infiltrated with novocaine and adrenaline. The patient complained of intolerable itching of the nose and face, for which reason nitrous oxide and oxygen was administered. A frontal osteoplastic flap was reflected downwards and outwards. After puncture of the lateral ventricle, the dura mater was opened along the lesser wing of the sphenoid. On lifting up the left frontal lobe of the brain, a tumour with the optic nerves stretched across it became visible. The tumour, which was attached to the olivary eminence, was about the size of a pigeon's egg.

By careful manipulations, it was brought fully into view. With a little coaxing, it almost delivered itself. The wound was closed, using the central drill hole for drainage for the first twenty-four hours.

On the following morning, the patient was restless and the pulse rate 120, but he was conscious, and asked when he would be able to go home. Thanks to efficient nursing, he made a good recovery. By January, 1942, the visual acuity had improved to right 6/60, left 6/6, and he was contemplating resumption of work.

On histological examination by Professor M. J. Stewart, the tumour proved to be a highly cellular meningioma.

The patient made a good recovery and resumed war production work at Chatham dockyard; but he succumbed to a recurrence which caused mental aberration a year later.

Case 3.—A case of chromophobe adenoma

In 1934, Mrs. H., aged 28 years, who had had amenorrhoea for eight years, was found to have bitemporal hemianopia and an

enlarged sella turcica. A paranasal operation was performed and radon inserted, as described in the *Brit. Med. Jl.*, Vol. II, p. 1,257, 1936.

A temporal island appeared in the right visual field and the left became normal. Mrs. H., who had adopted a baby in 1934, could play tennis.

In 1939 papilloedema developed and bitemporal hemianopia recurred. A modified Chiari operation was performed and the tumour removed; a slide is available showing a chromophobe adenoma, areas of which have undergone atrophy.

When last seen about a year ago, there was not much vision in the right eye, but the left was normal. The patient was able to accompany her husband to London on visits occasionally and lead quite a normal life.

My approach to intrasellar tumours is a modification of the paranasal route of Chiari (1911). Bilateral external rhinotomy is carried out through a median incision between the angular veins, as shown in the accompanying plate (see Fig. 2). When the body of the sphenoid has been distended by a large adenoma, the tumour can be excochleated with less risk, in my opinion, than by the transfrontal route. In the absence of sinusitis, this bilateral approach through the ethmoidal and sphenoidal sinuses allows manipulation or aspiration through one side and inspection through the other. As the brain is not exposed, it is a comparatively minor operation.

The lateral walls of the orbits are at right angles, the medial walls parallel. Only the lightest retraction of the orbital contents is permissible, however, if retinal thrombosis is to be avoided. Thirty-eight variations in the relationships of the optic nerves to the sphenoidal cells have been described by Onodi. An imaginary line connecting the anterior and posterior ethmoidal foramina, on the inner wall of the orbit, marks the upper boundary of this operation of access. The incision, being well supported, heals with an imperceptible scar, and without any tendency to webbing of the orbital margin.

Conclusions

Casualties at this crossroads—so to speak—between vision and organised life have been discussed. It would seem that the visual pathway is not the major one.

Normally, a hand held up to the forehead as in saluting is in sight of one eye but out of sight of the other; the shadowy monocular image is projected across the chiasma to the anterior third of the lateral geniculate body and thence to the antero-inferior extremity of the post-calcarine sulcus. I trust that this simple preliminary

test will not only reassure the reader, but also be found of service in busy clinics.

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QUININE AMBLYOPIA

BY

A. BISHAY

EGYPT

THE two last years which I spent in Kom-Ombo of Upper Egypt, a district infected with a severe epidemic of malignant malaria, had given me one of the most wonderful chances to study the subject of quinine amblyopia, and it would have been very difficult under normal circumstances to give such an account in such a short time. During this period I had seen in my hospital and private practice, seven cases of quinine amblyopia, which is relatively a large number of such cases for an ophthalmologist to see in two years. Dealing with these seven cases, I have observed some very interesting points in examination, diagnosis and treatment, which I am glad to state to my colleagues.

Symptomatology

From the accompanying table we can conclude :—

(1) The age of the patient does not matter in the case.

(2) The amount of the drug (quinine) must not necessarily be big as said by de Schweinitz, because out of my seven cases only two took a large dose of the drug, while the other five developed their amblyopia by taking ordinary doses; but the outstanding feature is that all of them took the quinine on an empty stomach. Thus in my opinion due to these observations, it is not only large doses of quinine that lead to amblyopia, but it is some kind of sensitiveness

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to quinine which leads to it, and when I reach the discussion about the theories of explanation of quinine amblyopia, I will discuss my point of view in detail.

(3) We can also see from the attached table that all of the seven cases, those who took large doses as well as those who took normal pharmacopoeial doses have developed vomiting after taking the quinine.

(4) Vomiting was followed in every case by loss of consciousness as an outstanding fact, and the patient after regaining his consciousness found himself blind. The period from taking the drug until the patient develops the amblyopia varies between a few minutes and one hour.

(5) Other symptoms mentioned by Foster Moore as tinnitus and deafness are not always the rule.

Clinical Features

From thorough examination of my seven cases, I put the main clinical features of quinine amblyopia as follows :—

(I) Anaemic blanched conjunctiva,

(II) Partial anaesthesia of cornea which is not always a constant sign.

(III) Dilated pupil.

(IV) Immobile iris "the limitation of immobility depends on the amount of defective vision and is complete if the vision is no P.L."

(V) Pallor of optic discs.

(VI) Marked contraction of retinal blood vessels.

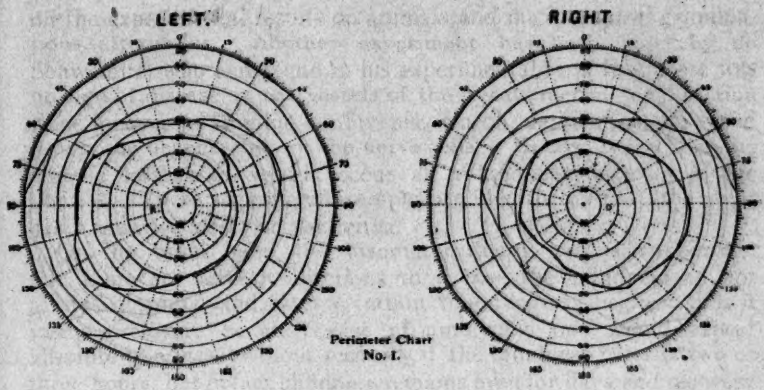
(VII) Marked contraction of field of vision which is observed in cases which do not develop complete amblyopia as well as in cases which recover. In these last cases (recovering cases) the contraction persists to a certain extent even after complete recovery. When a patient first regains vision he gets some sort of tubal vision with very contracted field (see charts).

(VIII) Diminution of colour sense, specially red and green.

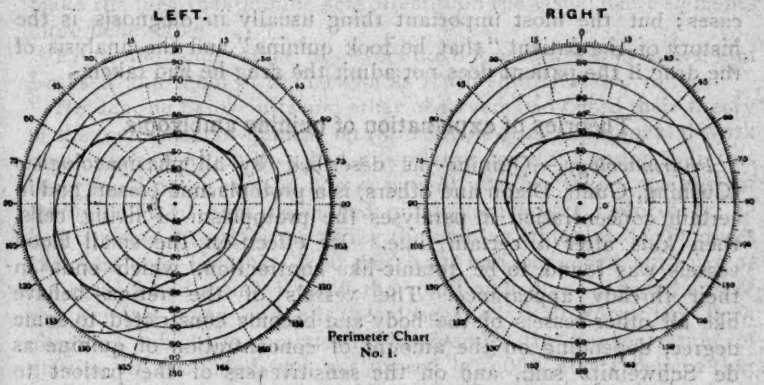
Other signs such as oedema of retina, haziness of optic discs, venous engorgement, etc., as described by Berens to be the earliest signs, I could not see in any of my seven cases.

Differential diagnosis

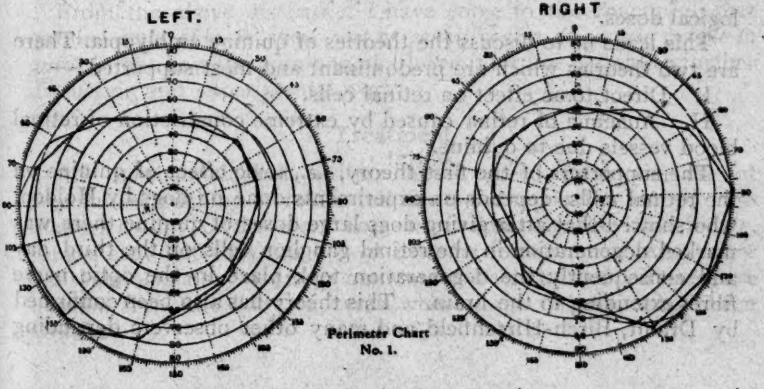
Other drugs which lead to a similar amblyopia as that of quinine are salicylic acid and salicylates, optochin, felix mass, organic compounds of arsenic ost atoxyl, etc., their amblyopia differs in details from that of quinine, *e.g.*, that of salicylic acid and salicylates is relatively shorter than that of quinine, that of organic compounds of arsenic is always of grave prognosis, and leads to blindness in many



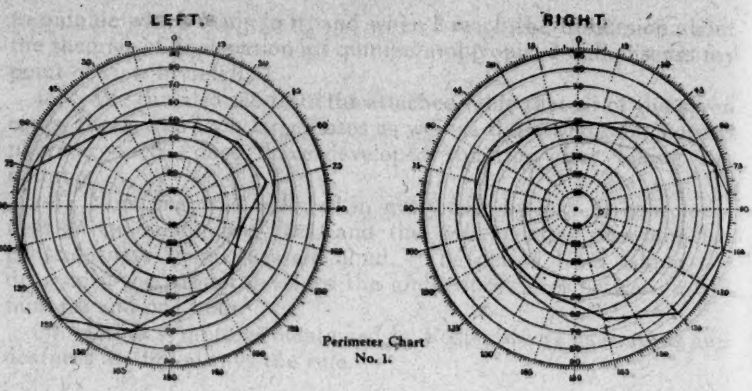
CASE No. 1, 25th day, V = 6/24.



CASE No. 2, after three months, V = 6/18.



CASE No. 6, after five days, V. = 6/24.



Perimeter Chart No. 1.

CASE NO. 7, 25th day, V. = 6/12.

cases; but the most important thing usually in diagnosis is the history of the patient "that he took quinine" and the analysis of the drug if the patient does not admit the drug he had taken.

Theories of explanation of quinine amblyopia

Pharmacology.—Quinine as described by all pharmacologists (Cushing, Gunn, Dixon and others) is a protoplasmic poison, and in certain concentration it paralyses the protoplasm of living cells, then kills after a certain time. Its effect on the small blood vessels was found to be tetanic-like contraction, which ends in their thready appearance. The vessels of the retina behave like all other vessels of the body and become constricted to some degree, depending on the amount of concentration of quinine as de Schweinitz said, and on the sensitiveness of the patient to quinine as I would say, because as it is clear from the table herewith, most patients have got their amblyopia from ordinary pharmacological doses.

This leads us to discuss the theories of quinine amblyopia. There are two theories which are predominant and most supported:—

I. Direct toxic effect on retinal cells.

II. Anaemia of retina caused by extreme constriction of retinal blood vessels due to quinine.

The supporters of the first theory, *i.e.*, toxic effect of quinine on the retinal cells, depends on experiments done on dogs by Holden, who showed that after giving dogs large doses of quinine there was marked degeneration in the retinal ganglion cells on the third day and consequently the degeneration took place in the optic nerve fibres extending to the brain. This theory has also been confirmed by Drault, Birch-Hirschfield and many other observers depending

on the experimental results on animals and microscopical examinations afterwards. Another experiment has been done by de Schweinitz, who had found in his experimental work that there was no sign of disease in the vessels of the uveal tract in serial section alone in eyes of quinine amblyopia, which deprivation of blood causes the degeneration of the nerve cells. He also found that the organic lesions of vessels occur as a secondary element in the process. These experiments emphasise the theory that the drug has a selective effect on the retina.

On the other hand the vasomotor theory has its supporters, but there are several objections to it, *i.e.*, the blindness is not always absolute, and after a certain time recovery begins; thus if vascular closure be the cause of amblyopia one would expect absolute blindness without recovery if the blindness persists two or three hours, but in fact blindness remains even for days and recovery occurs. There are many other objections to this theory which make the idea that quinine acts directly on the visual nerve elements more believeable.

Elliot and some other observers do not accept either views, and I myself join them in their belief as I will shortly state:—

Holden, de Schweinitz and other observers had based their theory of the toxic effect of quinine on retinal cells after experimental work on animals to which they had given large doses of quinine, but this theory will never explain how a patient who has taken one dose of quinine of 0·30 gms. developed quinine amblyopia. Moreover, he had vomited directly after taking the quinine which made the doses absorbed even less than 0·30 gms. as it had happened with five of the cases I had seen? Even if the vomiting had not rejected any of the quinine taken and all the dose (*i.e.*, 0·30 gms.) has been absorbed which is practically impossible, the concentration of quinine in the blood will not exceed 1/15,000, and I believe that such concentration can never be toxic to any kind of cells however delicate they may be.

From the above discussion I have come to the conclusion that *quinine amblyopia is some sort of sensitiveness of certain people to quinine*, but how the quinine acts I leave it for the present to further discussion and experimental work.

Treatment

All ophthalmological writers have agreed upon the use of strychnine, pushing it to its full limit, and upon the use of vaso dilators as amyl nitrite, etc. Some use in addition salicylates, iodide, tonics, etc., but they are not of extreme importance. Also other ophthalmologists advise large amounts of fluids to wash off excessive quinine from the body, in cases where large quantities had been absorbed.

Name of patient	Age years	Amount and manner of taking quinine	Symptoms	Examination	Treatment	Result	Notes
1. Mahfouz Mohamed	50	250 c.c. of 1 per cent. quinine solution on an empty stomach	Giddiness, severe vomiting, unconsciousness; regained consciousness after 20 minutes; found himself blind	In all seven cases I have found nearly the same signs with some difference in severity:—	Strychnine pushed to its full level, retro-bulbar and by mouth	Regained H.M. 3rd day and 6/24 on 25th day. Field of vision contracted as in charts. After three months 6/18 c slight improvement of field	Cornea clear. Patient says his original vision was 6/9 and 6/6 (see charts)
2. Mohamed Eid ...	25	0·30 gms. of quinine on an empty stomach	Severe vomiting, felt unconscious; after half-an-hour regained consciousness but felt completely blind	I. Anaemia of conjunctiva II. Partial anaesthesia of cornea III. Dilated pupils IV. Immobile iris	ditto	Regained H.M. on 5th day, 6/24 after one month. No more improvement	Cornea clear
3. Nefissa Ali Ibrahim	30	Three coffee cupsful of 1 per cent. quinine solution on an empty stomach	Severe vomiting, felt unconscious for few minutes, then right eye blind, and left H.M.	V. Pallor of optic discs VI. Marked contraction of retinal blood vessels	ditto	2nd day L. 50 cms. 10th day R. 1/60, L. 2/60. 30th day R. 5/60, L. 6/36	Both cornea are nebulous
4. Sayed Mohamed El-Selwawy	18	0·30 gms. quinine on an empty stomach	Severe vomiting, felt unconscious and became totally blind after he regained consciousness five minutes later	VII. Marked contraction of field of vision if blindness is not complete	ditto	4th day regained H.M. 15th day regained 6/36. 30 day regained R. 6/18, L. 6/24	Left cornea pannus
5. Sayedeh Hussein Ibs Omar	25	Coffee cupful of 1 per cent. quinine solution on an empty stomach	Severe vomiting for a long period, then felt unconscious; after half-an-hour awakened blind	VII. Diminution of colour vision	ditto	6th day regained H.M. 30th day regained 6/60 and 6/24	Cornea nebulous
6. Danyal Eff Moun	42	Ordinary dose of 0·3 gm. quinine on an empty stomach	Vomited, felt unconscious, after few minutes awakened totally blind		Paracentesis at once, then strychnine pushed to its full level	Regained P.L. on table. Regained 50 cms. 2nd day. Regained 6/24 5th day, field little contracted	Pt. is myope 6–3·0 (see charts)
7. Ibrakim El Suny El Kefty	50	Ordinary dose of 0·30 gm. quinine on an empty stomach	Much vomiting, exhausted, felt semi-unconscious and observed his vision diminishing little by little until he became blind		ditto	Regained P.L. on table. Regained H.M. and 1/10 2nd day. Regained 6/18 and 6/12 25th day; field not much contracted	Pt. (see charts)

I have tried some other sort of treatment which helped me a lot to get better results as well as in shortening the period of treatment. Having tried it on my last two patients only, no full account can be given. These last two patients when I first saw and examined them to be sure of the diagnosis, I immediately performed paracentesis, and I was astonished to find out that they perceived the light of the operation lamp while they were still on the operation table, taking in consideration that they were completely blind with no P.L. On the second day one of them counted fingers at a distance of 50 cms.; and the other had only hand movements. Examining the fundi of these two patients on the second day, I found that the vaso-constriction was much less, so was the pallor of the disc. Moreover, they both took much shorter time to be cured and their fields are much less contracted than is usual after cure compared with the other cases treated with ordinary means of strychnine, etc. How does the paracentesis act in these cases? Is it only due to diminution of intra-ocular pressure and subsequent dilatation of vessels; or due to change of intra-ocular fluids (aqueous)? or a combined action of both? It is still a problem that needs further investigation.

Conclusion

It is obvious from what I have mentioned above that three important new facts were reached from dealing with my seven cases:—

(I) The amount of quinine that the patient takes need not be essentially large as described by all other writers.

(II) Neither vascular nor toxic theories explain all cases, and I believe there is another element in the subject, *i.e.*, sensitiveness of patient to quinine.

(III) In treatment, paracentesis immediately done to the patient, produces better and quicker results.

I hope that these points will be of interest to my colleagues to know and to deal with for further investigations.

NECESSITY OF AN INTERNATIONAL STUDY CENTRE OF TRACHOMA*

BY

DR. L. POLEFF

RABAT, MOROCCO

IN connection with the general tendency for international co-operation in various matters of economic and cultural life of the different

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states which are endeavouring to resume work after the war, the question rises of a closer contact amongst different nations and also medical activities especially in the field of the struggle against epidemics.

Amongst infectious diseases of epidemic character, there is TRACHOMA which, in spite of taking the first place according to the great number of victims caused through it, and in spite of the fact that it concerns the most important organ of the human body, that is the sight, is comparatively little served as far as scientific researches are concerned. Moreover, this disease is not reduced but is on the contrary spreading more and more all over the world. About 90 per cent. of inhabitants in the largest countries having a population of several hundred million souls (China, East Indies, etc.) and a considerable percentage of a few other countries suffer from this disease which presents, in an absolute number the principal source of blindness[1].

Certain people, as Jews, Arabs, Mongols, seem to be more subject to trachoma, but none of the European races remains unaffected by it; furthermore, trachoma will indubitably enlarge its spread in all continents in consequence of the war[2].

The infection does not spare any category of people, it spreads even to the highest class of society though it preferably affects the poor and working classes. Due to the fact that this disease has substantially a chronic and long-lasting character, this has a great influence not only over the individual capacity but also in the economic life of the countries where trachoma is endemic, and it may be considered as one of the highest social scourges of this epoch. The harm caused to human beings through trachoma, concerning the sight organ, would not be less, qualitatively speaking, than that produced through the most cruel war, but quantitatively, it would certainly be greater than the latter cause, taking into consideration that even during peace time its action is a permanent one, whereas the harm caused through war is obviously sporadic.

Meanwhile in contrast to the majority of other infectious diseases, the cause of which has been long ago definitely known and against which struggle still goes on a strict scientific basis, the infectious agent of trachoma remains up to now, undetermined[3]. The treatment of this disease in principle only slightly differs from the mediaeval manipulations by Arabian toubibs[4] whereas nothing can be said about the real prophylaxis of this infection as long as its aetiology is undetermined.

The cause of this poor outstanding situation is due to the fact that trachoma is excluded from the systematic studies and extensive microbiological researches, from which benefited since Pasteur, Lister and Koch, the other so-called general infectious diseases. As trachoma requires ophthalmological knowledge, it happened

to be left to the care of clinicians who have little spare time or well and sufficiently equipped laboratories.

In spite of the quantity of various Institutes: Pasteur, bacteriological, hygienic, microbiological, etc., which are spread all over the world, destined for the study and treatment of any and all infectious diseases there does not exist anywhere even one establishment which might have been dedicated to trachoma, except in the Soviet Union where there are a few Trachomatological Institutes having rather local and practical value. North Africa, birth place of trachoma, has not even one specialised Trachomatological Laboratory, though here the number of consultations for eye diseases of which the majority is given to trachoma, is equal or even more important than those of all other diseases altogether[5].

In the meantime it was proved that the trachomatological problem presents itself in a much more difficult and complicated way for a final resolution than many other questions of microbiology. Trachoma therefore absolutely claims a specialisation such as for tuberculosis, with which it may be compared, as far as their propagation all over the world is concerned. It is well known that very remarkable results have been obtained in the struggle against tuberculosis since it became a separate speciality; we might expect the same as far as trachoma is concerned. The initial condition of success in this direction would be the creation of a special establishment or Study Centre which would be equipped according to the modern requirements of scientific researches. This Centre must set itself, as the most urgent objective, the definite clearing of the aetiology of trachoma, this is to say the question which obviously stops the efficient development of the struggle against the infection.

Such a scientific Centre, under the form of an Institute of Trachomatology would have, according to its designation, a character inter- or rather super-national because trachoma represents a world social scourge. Moreover, by international co-operation, it would be really useful in this case to establish a common stage in order to elaborate a single plan of scientific research, due to the fact of the misunderstanding and pending questions existing in various countries, as far as the gist of the problem of trachoma itself is concerned.

The International Trachomatological Institute must either be dependent on state aid financially from those states which are interested in the struggle against trachoma or else with the help of private charitable organisations which would like to contribute to the fight against blindness. The most convenient place for this establishment seems to be MOROCCO, the country situated between the ancient and the new Continent and so near Europe, which does not possess a too hot climate, harmful to the delicate

experience of cultivation of infectious agents, however hot enough to keep experimental animals which are receptive of trachoma, *i.e.*, apes, etc. The necessary human material for these researches exists here in large quantity and in the nearly complete absence of preventive measures against epidemic spread.

Summary

1. Trachoma, the index of morbidity of which in several countries exceeds 90 per cent. of the population, presents one of the biggest social world scourges of this epoch and in an absolute number is the principal source of blindness.

2. The harm caused to humanity by trachoma as far as the eye is concerned is not inferior qualitatively speaking to damage resulting through the most cruel war, and quantitatively it certainly exceeds it.

3. Meanwhile the provoking agent of trachoma remains up to now, not completely definite, and the struggle against it is purely empirical and in most countries absolutely unsatisfactory.

4. The cause of this state of things is that trachoma, contrary to other infectious diseases, has been left outside of the systematic laboratories' studies in the absence of establishments specially installed for it.

5. For successful researches on trachoma, it is necessary to create a specialised Study Centre well equipped according to the latest progress on scientific lines which can be accessible to scientific men of the whole world who would like to devote themselves to researches in this subject.

6. The most convenient place for this establishment is MOROCCO, trachoma country "par excellence," situated between the ancient and the new Continents.

7. The creation of such an institute would open a new era in trachomatology and be of lasting benefit to the world in the struggle against blindness.

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LENS EFFICIENCY—A CLINICAL CONCEPT*†

BY

JOSEPH I. PASCAL

NEW YORK

THE fact that a lens has a different effectivity depending upon its position before the eye is well known. We say a convex lens gains in effectivity when moved away from the eye and loses in effectivity when moved closer to the eye. A concave lens behaves in just the opposite way. There is, however, another feature of changes in lens power which is not dependent upon movement farther from or nearer to the eye. This variable lens effect may be called its "efficiency," which may be of an ascending order, termed positive efficiency or of a descending order termed negative efficiency. A similar gradation of efficiency may be postulated with reference to the accommodation.

It is well known that if a natural emmetrope, an uncorrected hypermetrope and an uncorrected myope each accommodate the same amount, they are not all focused for the same distance. But this is also true, though to a less extent, for the corrected hypermetrope and the corrected myope. The prevalent idea that the corrected hypermetrope and the corrected myope accommodate 1·0 D. for one metre, 2·0 D. for 1/2 mm. and so on is not correct.

For example, the natural emmetrope accommodating 3·0 D. is focused for 333 mm. from the eye. But the 2·0 D. corrected hypermetrope and the 2·0 D. corrected myope when accommodating 3·0 dioptres are focused for 360 mm. and 309 mm. respectively. As a corollary of the preceding the uncorrected hypermetrope has to accommodate more and the uncorrected myope has to accommodate less than the emmetrope, for the same distance. But this difference also holds good, though to a less extent, for the *corrected* hypermetrope and the *corrected* myope. The separation of the two elements which together make up the "Lens emmetrope," produces a difference in what may be called accommodative efficiency, using the term not in a physiological sense, but in a purely optical sense, the same as we shall consider in connection with lens efficiency.

Taking the accommodative activity of the natural emmetrope as a standard and calling this normal efficiency, a more efficient activity may be said to have *positive* efficiency, while a less efficient activity may be said to have *negative* efficiency.

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On this basis the accommodation of the corrected hypermetrope has negative efficiency, because he has to use *more* accommodation than the natural emmetrope for the same distance. The accommodation of the corrected myope has positive efficiency because he has to use *less* accommodation than the natural emmetrope.

In a similar sense the plus lens which replaces the accommodation may be said to have positive or negative efficiency. If a plus lens of less power replaces a given amount of accommodation the lens has positive efficiency. If a plus lens of greater power replaces a given amount of accommodation the lens has negative efficiency.

The efficiency of the replacing lens in different refractive conditions is as follows: In the natural emmetrope it has a negative efficiency. In the corrected myope, it also has negative efficiency, which is even more marked. In the corrected hypermetrope, it may have positive or negative efficiency, depending upon what part of the accommodation it replaces. When it replaces the accommodation used to neutralise in whole or in part the hypermetropia, the lens has positive efficiency. But when it replaces the accommodation used over and above that amount the lens has negative efficiency.

The value of the replacing lens and its efficiency depend upon four factors (1) the kind of ametropia (2) the amount of ametropia (3) the distance between the lens and the eye and (4) the level at which it replaces the accommodation. By this is meant whether it replaces the 1st, 2nd, 3rd or 4th dioptre of accommodation. In all cases the replacing lens or the equivalent lens has its least value when replacing the 1st dioptre of accommodation. Its value constantly increases as it replaces the 2nd, 3rd or 4th dioptre of accommodation. Thus the equivalent lens in natural emmetropia, for replacing the 1st dioptre of accommodation is plus 1·02, but its value for replacing the 4th dioptre of accommodation is plus 1·16.

This increase has its analogue in the physiological phase of the accommodation as it takes more effort to accommodate for the second dioptre than it does for the first dioptre and correspondingly more for the third and fourth dioptre.

The reason for the differences in accommodative efficiency in different eyes, optically considered, lies in the fact that the corrected ametrope has, what may be considered, a different basic accommodative unit from the natural emmetrope. This basic unit depends mainly upon the kind and amount of ametropia. The basic unit of lens power is the dioptre, one dioptre corresponding to a focal distance of 100 cm., 2 D. to a distance of 50 cm., 3 D. to a distance 33·3 cm., and so on. The natural emmetrope whose accommodative efficiency we may use as a standard and call normal has the same 1·0 D. as his basic unit of accommodation. He accommodates 1·0 D. for a distance of 100 cm., 2 D. for a distance of 50 cm.,

3 D. for a distance of 33·3 cm., and so on. But the basic accommodative unit of the corrected ametrope is not 1·0 D. It is always either more or less than 1·0 D. and depends upon three factors. These are (1) the kind of ametropia (2) the amount of ametropia and (3) the position of the correcting lens.

The basic accommodative unit of the corrected hypermetrope is always more than 1·0 D. For example, the basic unit of the 4·0 D. corrected hypermetrope is 1·19 D. and at a distance requiring 4 units of normal accommodation, say, at 25 cm. from the eye, this hypermetrope has to use 4 times his basic unit, *i.e.*, 4 x 1·19 which means an accommodation of about 4·75 D.

The basic accommodative unit of the corrected myope is always less than 1·0 D. The basic unit of a 4·0 D. corrected myope for example is 0·87 D., that is, ⅞ of a dioptre. At a distance requiring 4·0 D. of normal accommodation in the natural emmetrope, that is, 25 cm. from the eye, this myope has to use four times his basic unit of a 0·87 D. This shows an accommodative need of only 3·44 D. The difference between the two is about 1·25 D.

One important bearing of these considerations, is in the correction of presbyopia. The condition and degree of presbyopia which may be termed an error of the accommodation cannot be as accurately defined as errors of refraction. But for purely optical reasons and because of variation in accommodative and lens efficiency, we find presbyopic differences which are clinically significant.

A natural emmetrope, a corrected hypermetrope of say 3·0 D. and a corrected myope of, say, 3·0 D. will all be considered equally presbyopic if they each accept the same reading addition for the same distance, say, a plus 2·0, for a distance of 250 mm. from the eye. But if we compare the amount of accommodation each of them has to contribute to focus at 250 mm. we find that they contribute considerably different amounts. The natural emmetrope contributes 2·24 dioptre, the corrected hypermetrope contributes 2·53 dioptre and the corrected myope contributes only 2·0 dioptres. The corrected hypermetrope has to accommodate about 0·25 D. more and the corrected myope has to accommodate about 0·25 D. less than the natural emmetrope, making the difference between the two a little over 0·50 D. Yet these three are generally considered equally presbyopic because they take the same reading add for the same distance.

If the degree of true presbyopia is measured by the amount of accommodation one can contribute for near focusing, then in our illustration the natural emmetrope is 2·25 D. presbyopic, the corrected hypermetrope is a little more than 2·50 D. presbyopic, while the corrected myope is only 2·0 D. presbyopic.

If the same three individuals each contribute the same amount of accommodation, say, 2·0 dioptres for a distance of 250 mm., we

may consider them equally presbyopic in the true sense. But we shall find that now they each take a different reading addition. Using the same data as before, we find that the natural emmetrope needs an add of plus 2·26 D.; the corrected hypermetrope needs an add of plus 2·52 D.; the corrected myope needs an add of only plus 2·0 D. So that in the commonly used parlance, and judging by the strength of the reading add the corrected hypermetrope is a half dioptre more presbyopic than the corrected myope.

Lastly, if the same three individuals are equally presbyopic in both senses, in that they each contribute the same amount of accommodation, say, 2·0 D. and they each get the same reading add, say, plus 2·0 D., then they are each focused for a different distance. The natural emmetrope is focused for 265 mm., the corrected hypermetrope for 281 mm., and the corrected myope for 250 mm., all distances measured from the eye.

Most books on visual optics contain a table giving the approximate presbyopic adds for different ages for different distances. But the tables generally do not take into account the differences in lens and accommodative efficiency herewith presented. An understanding of these differing efficiencies will help to explain the many deviations from the tables often encountered in clinical practice.

A similar consideration applies to the methods for determining the amplitude of accommodation in specific cases. The most direct and most commonly used method is to locate the near point of accommodation. Published tables give the average near point for different ages. But it can be seen from the preceding discussion that the location of the near point does not *tell the same story* in the different refractive conditions.

As an example, in the natural emmetrope a near point of 200 mm. from P. of the eye would show 5·0 D. of accommodation. But the same near point in a 3·0 D. corrected hypermetrope or a 3·0 D. corrected myope would show an amplitude of 5·62 D. and 4·47 D. respectively, a difference of more than 1·0 D.

The difference in the value of the basic accommodative unit in different refractive conditions is of special significance in the presbyopic correction of anisometropia. A patient who wears a plus 2·0 D. before one eye and a plus 4·0 D. before the other eye and assuming that these are full and proper corrections can never focus a near object with both eyes at the same time. If the less hypermetropic eye is the dominant eye and sets the pace for the accommodation of both eyes, then, say, for a distance of 250 mm. the more hypermetropic eye is *under*-accommodated by about 0·38 D. If the more hypermetropic eye is the dominant eye and sets the pace for both eyes, then the less hypermetropic eye will be *over*-accommodated by about 0·38 D.

Similar conditions of course are found in unequal myopic corrections. A patient who wears a −2·0 D. before one eye and a −4·0 D.

before the other eye can never focus a near object with both eyes. If the less myopic eye is the dominant eye and sets the pace for the accommodation, then for a distance of 250 mm. the more myopic eye is *over*-accommodated by about 0·26 D. If the more myopic eye sets the pace for the accommodation then the less myopic eye will be *under*-accommodated by about 0·26 D. In other words in either case when one eye is in focus for a near object the other eye is necessarily out of focus. Of course we know that the anisometropic eyes could not both focus a near object before correction. But it is interesting to note that they cannot do so even after correction, though the discrepancy is much less.

When these anisometropes become *partly* presbyopic, not totally presbyopic, in which case we have a special condition, the same add for the two eyes will leave conditions as they were before, *i.e.*, both eyes cannot be in focus for a near object at the same time. But now it is possible to give the patient equally focused vision in both eyes, for any chosen distance. This is accomplished by giving a stronger add to the more hypermetropic eye, or to the less myopic eye, that is, to the eye which has intrinsically less refractive power. The unequal adds will enable both eyes to be in focus at the same time for the distance chosen. This, incidentally, is something which the eyes could not attain in the pre-presbyopic period.

If the eyes are totally presbyopic, then the same add to *both* eyes irrespective of their differing refractive errors will put both eyes in focus for any chosen near distance. In this respect, then, the anisometrope when totally presbyopic is better off than he was before becoming presbyopic.

The cardinal point to note is the existence of a different accommodative unit for each refractive condition. Since in anisometropia, even when corrected, the two eyes have different accommodative units, both eyes can never be in focus for a near object at the same time except in total presbyopia.

For the same reason the corrected astigmatic eye can never focus a near object accurately in both principal meridians, because each principal meridian has its own basic accommodative unit.

Another element which affects lens efficiency for near vision pertains to the form and thickness of the lens used. To mention it very briefly: a given amount of hypermetropia or myopia may be corrected with lenses of different form and thickness, so long as these lenses have the same vertex power, and the lenses are placed the same distance from the cornea. It is, indeed, to provide for this equality of effect for lenses of different form that the vertex dioptre has been adopted. But in near vision, the double convex, plano-convex and meniscus convex of the same vertex power, do not have equal efficiency. For example, a biconvex, a plano-cx, a meniscus-cx, all of which have a vertex power of plus 3·0 D. and all

placed with their back surface at the same distance from the cornea will all have the same effective correction for the hypermetropia. But they will not have the same efficiency in near vision. The D-cx will have the greatest efficiency, the meniscus convex the least efficiency. In a plus 10 D. lens, for focusing at a distance of 30 cm. from the eye, the D-cx will excel the deep meniscus by about 0·75 D. By this is meant that the meniscus convex will require 0·75 D. more accommodation than the double convex.

These investigations show that when we consider the correction of refractive and accommodative anomalies from a strictly optical and mathematical viewpoint we find a number of unexpected discrepancies. Fortunately in most of our work we may consider the common visual errors from a physiological standpoint. As such, the body is provided with compensatory mechanisms for mastering these deviations. Only in cases where the physiological adjustments are inadequate to cope with these discrepancies is a clinical evaluation of them necessary.

Table I will show a few of the points discussed in condensed form. The first column—T.A. shows a true ametropia in the first principal plane of the eye. The second column shows the "Lens" ametropia as measured by the correcting lens. Calculations for lens and accommodative efficiency are based on the lens being 20 mm. from the first principal plane of the eye.

Table I	Distance	A. U. 1m.	50 cm.	33·3 cm.	25 cm.
T. A. at P.	Nat. E.	1·0 D.	2·0 D.	3·0 D.	4·0 D.
1·02 D.H.	1·0 D.H.	1·04	2·08	3·12	4·16
0·98 D.M.	1·0 D.M.	0·96	1·92	2·88	3·84
2·08 D.H.	2·0 D.H.	1·08	2·16	3·25	4·32
1·92 D.M.	2·0 D.M.	0·93	1·86	2·80	3·71
3·19 D.H.	3·0 D.H.	1·13	2·25	3·38	4·50
2·83 D.M.	3·0 D.M.	0·89	1·78	2·68	3·58
4·35 D.H.	4·0 D.H.	1·18	2·36	3·53	4·70
3·70 D.M.	4·0 D.M.	0·86	1·72	2·58	3·45
5·56 D.H.	5·0 D.H.	1·23	2·46	3·69	4·90
4·55 D.M.	5·0 D.M.	0·83	1·66	2·49	3·33
6·80 D.H.	6·0 D.H.	1·28	2·56	3·84	5·11
5·35 D.M.	6·0 D.M.	0·80	1·60	2·40	3·22
L at 20mm.	E. R. L.	+1·02	+2·08	+3·19	+4·35

It is seen that the plus correcting lens has positive efficiency as it takes a lens of less power to correct a greater degree of hypermetropia, thus plus 1·0 for 0·98 D. of true hypermetropia, plus 6·0 for 6·80 of true hypermetropia and so on. The minus lens has negative efficiency as it takes a minus lens of more power to correct a lesser degree of myopia, thus a −1·0 for 1·02 of true myopia, a −6·0 for 5·35 D. of true myopia and so on. In high errors the difference is specially significant. Thus a patient who is corrected with a −30·0 dioptre lens, has a true myopia of only 20·0 dioptres.

Column 3. A.U. shows the different accommodative units for different refractive conditions. It is seen that the accommodative unit for the corrected hypermetrope is more than 1·0 D. being 1·04 for the 1·0 D. hypermetrope, and increasing until it is 1·28 for the 6·0 D. hypermetrope. Succeeding columns show the amount of accommodation he has to use for different distances. Thus at 25 cm. from the eye where the natural emmetrope has to use 4·0 D. of accommodation he has to use 4 times his unit which amounts to an accommodation of 5·12 D. (column 6). The accommodative unit of the corrected myope is less than 1·0 D. being 0·96 D. for the 1·0 D. myope and diminishing till it is 0·80 for the 6·0 D. myope. At a distance of 25 cm. he has to accommodate 4 times his accommodative unit which amounts to only 3·20 D.

An examination of any one group, say, the 3·0 D. hypermetrope and the 3·0 D. myope (middle of column 3) shows that at 25 cm. the hypermetrope has to accommodate 4·50, while the myope has to accommodate 3·56. If these two individuals are equally presbyopic in the true sense, in that they can each contribute the same amount, say, 2 dioptres, then the hypermetrope has a deficiency of 2·50 D. while the myope has a deficiency of only 1·56 D. showing the need for different adds. Various combinations of anisometropia and of astigmatism can be made by reference to column 2, and the differing accommodative needs seen in the succeeding columns.

The bottom line shows the value of the equivalent replacing lens, E.R.L., for different conditions and four different distances. It is seen that the same lens replaces *all* the accommodation necessary for any distance. Thus an add of + 3·19 (col. 5) replaces all the accommodation necessary for 33·3 cm., whether this be 3·12 of the 1·0 D. hypermetrope or 3·84 of the 6·0 D. hypermetrope, or 2·88 D. of the 1·0 D. myope or 2·40 of the 6·0 D. myope. For this reason in total presbyopia the same replacing lens puts *both* eyes in focus, in spite of widely different refractive conditions. This line also shows that the value of the replacing lens increases (and its efficiency diminishes) as it replaces successive dioptres or units of accommodation. Thus it takes plus 1·02 to replace the 1st dioptre of accommodation, plus 1·06 (2·08 − 1·02) to replace the 2nd dioptre of accommodation, plus 1·11 (3·19 − 2·08) to replace the 3rd dioptre

of accommodation and plus 1·16 (4·35 – 3·19) to replace the 4th dioptre of accommodation.

To bring out the points presented more fully the distance between the second principal point of the lens and the first principal point of the eye was taken as 20 mm. instead of the usual 15 mm. This somewhat exaggerates the findings.

OPHTHALMIC PROBLEMS AND VISUAL STANDARDS IN INDUSTRY*†

BY

JOSEPH MINTON

LONDON

WITH the expansion of the Industrial Medical Services has come the realization that the industry presents many visual problems which have to be faced and eventually solved. So far, although this country has made no unified attempt to deal with the vision of employees, individual firms have done so. In 1938 the Industrial Welfare Society sent out a questionnaire to its 750 member firms in order to find out whether applicants for employment had to pass eyesight tests and what minimum visual standards were considered necessary. From the replies received from 398 firms, employing about 1,000,000 workers, it was found that most firms do not insist on eyesight tests; and that the many firms who are vision conscious vary in their approach to the problem. Thus while many small firms do not require employees to pass eyesight tests, others representing the same branch of industry insist on them. A large number of firms, having instituted eyesight tests demand a visual standard of 6/6 or 6/9 in each eye, while other firms are satisfied with 6/12 in each eye.

In this paper an attempt is made to elucidate some of the principles which may guide industrial medical officers in the selection of employees for various jobs in industry. There is no doubt that greater efficiency will be achieved in industry if we place the workers in the jobs for which they are best physically fitted. This would eventually be followed by a larger output in production and would in addition ensure the safety of the workers in many branches of industry. However, under present conditions of employment a country wide compulsory medical examination could not be instituted for all workers. Should such an examination be

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carried out a huge pool of physically unfit would be created whose members would have to be re-trained and then placed in suitable employment. This is a big problem which it is hoped will be tackled in the future. A number of private firms have already adopted the principle of a compulsory medical examination of employees and the direction of workers into jobs for which they are best physically suited. This policy which is ideal if carried out in combination with the training of the physically handicapped must be put on a sound medical basis.

Ophthalmic work of the examining factory surgeon

The Factories Act of 1937 provides that juveniles (14-16) should be examined by the examining surgeon and an eyesight test be carried out. The general examination of the workers must be thorough; the examining surgeon should be able to refer cases to consultants for special examination. At present the examining surgeon is given no instructions as to the visual standards required in the various branches of industry and in most cases he has no facilities for the efficient examination of the vision of the juveniles. It is essential that the examining surgeon and the industrial medical officer should use a Snellens type at 20 feet when the worker's vision is tested, and should the vision of the applicant for employment be less than 6/12 in each eye he should be referred to an ophthalmic surgeon. The Medical Boards examining all men for War Service refer those whose vision is less than 6/12 in each eye to an ophthalmic surgeon for an opinion. The same procedure might well be followed by the examining surgeon and the industrial medical officer. The ophthalmic surgeon would then report on the vision of the individual as corrected with glasses. The visual standards laid down by the Army, Navy, and Air Force are based on the vision of the individual corrected with glasses. In special jobs in the Navy and for Air Crews in the Air Force as well as in the case of drivers of public vehicles (trains, buses, and trams) high visual standards without glasses are demanded. For all workers in industry the use of glasses presents no handicap and the efficiency of the worker is in no way diminished by their use. On the other hand investigations in the various branches of industry have shown that workers whose vision has been satisfactorily corrected with glasses have suffered from fewer symptoms of eyestrain when engaged at work than the workers who have not had an ophthalmic examination.

Suggested visual groups in industry

Modern industry is capable of employing men and women with all grades of vision—from Grade 1, with the highest vision, to the partially and even totally blind. The standards of vision required

in industry need not be rigid, but should vary according to the jobs assigned to the workpeople in the factory. For purposes of classification all occupations can be divided into four groups. In the first group are the occupations which require especially good eyesight, such as the very close work necessary in the manufacture of silk yarns, silk hose, inspection and manufacture of electric light bulbs and radio valves, watch making, invisible mending, jewel work, etc. In the second group are the industrial occupations and distributive trades which require normal eyesight. In the third group are those occupations suitable for those with weak eyesight, such as cookery, soapmaking, gardening, billposting, etc. In the fourth group are the trades in which blind people are employed, brush making, basket work, piano tuning, massage, physiotherapy, and many others. A more detailed classification of the visual standards required in industry is given below. The following grades of vision are suggested in allocating applicants for employment, whether juveniles or not, to various occupations.

Grade I vision.—To this group belong all those possessing 6/6 or 6/9 vision in each eye and also those having 6/6 in one eye and not less than 6/36 in the other eye. Individuals in this group are fit for all occupations.

Grade II vision.—Individuals having not less than 6/12 in each eye and also those having 6/12 in one eye and not less than 6/36 in the other eye. Workpeople with Grade II vision are fit for all industrial occupations except for the very close work essential in the manufacture and inspection of radio valves, electric lamps, certain silk yarn trades and a few others. Grade II vision is sufficient for all clerical work, the engineering industry, and the driving of vehicles.

Grade III vision.—In this group are all the one-eyed people who have 6/6, 6/9, or 6/12 in the good eye, and less than 6/36 in the other eye, or who have one blind eye. The one-eyed with 6/6 in the good eye are fit for all occupations even for those which require fine close work. The one-eyed who have 6/9 or 6/12 vision can be engaged in most trades and industries. Certain occupations such as coalmining, and certain operations in the engineering trades such as hammering, chipping, turning, milling, etc. present a greater danger of injury to the eyes. It is therefore suggested that one-eyed workers should not be engaged in coalmining or any of the above mentioned engineering operations.

Grade IV vision.—To this group belong the workpeople who have 6/24 vision in each eye, or 6/24 in one eye and 6/36 in the other eye. People with grade IV vision can be employed in all outdoor occupations, building trades, carpentry, dock labour, portering, and many other like trades.

Grade *V vision*.—To this group belong the blind and partially blind and can include all individuals with less than 6/36 vision in either eye.

The National Institute for the Blind has issued several pamphlets dealing with the employment of the blind. They show how since the beginning of the war the blind and partially blind have been employed in hundreds of industrial occupations. (1) Assembling of petrol tanks, crash helmets, ball bearings, etc.; (2) Bakery work; (3) Boot repairing; (4) Catering; (5) Clerical work; (6) Engineering work, and (7) Machine operating, and several others.

This subdivision of workpeople into 5 groups is meant to be a guide only, for the industrial medical officer will often come across workmen with 6/24 vision in each eye doing excellent work in the engineering trades where a higher vision should be required. Vision is only one of the factors necessary in the make up of the skilled worker. High intelligence and experience often counterbalance the handicaps which arise from a poor visual acuity. Such people should not be turned away from their jobs for in the selection of the right man for each job the total mental and physical make up of the individual should be the guide.

Close Work.—Fine work at close range presents a special problem in industry. The radio valve manufacture, electric lamp inspection and manufacture, fine weaving and silk hose manufacture necessitate working at ten inches or even less from the job. This requires a constant accommodation effort and convergence to a greater degree than does ordinary clerical work. In the selection of workers for these jobs greater attention should be paid to a full investigation of vision. The visual acuity required is 6/6 or 6/9 in each eye. The muscle balance and binocular vision should also be investigated. A Maddox wing can be used for measuring the muscle balance of the eyes for near vision and a Worth's amblyoscope is a very convenient instrument for estimating the degree of binocular vision (fusion, stereopsis, and convergence). Both instruments are small and cheap. Industrial Medical Officers are not usually fully acquainted with the details and interpretation of muscular imbalance. It would therefore be advisable that an investigation by an ophthalmic surgeon be carried out on all individuals engaged or likely to be engaged on such work. Young men and women with a high error of refraction (latent hypermetropia) will often have 6/6 vision but will suffer from headaches when engaged at close work. In all such cases a routine examination by an ophthalmic surgeon would lead to a correction of refractive errors and of muscle imbalance and thus would prevent headaches and eyestrain from which workers often suffer. As a general rule one can state that individuals with

refractive errors, if properly corrected with glasses, suffer no discomfort when engaged at close work. Older workers wearing glasses to correct their presbyopia are just as efficient as younger workers. Investigations of the Industrial Fatigue Research Board in 1927 and 1928 (Weston and Adams) have shown that persons engaged in very fine close work suffer from eyestrain which is in many cases relieved by the wearing of spectacles provided with strong prisms (base in) to relieve the excessive convergence. These investigations have been confirmed and in some factories these spectacles, which are also provided with a magnifying lens are issued to the workers, but of course they are not always worn. Dr. L. B. Bourne recently reported on the procedure in careful selection of workers employed in radio valve manufacture which involves close work on very fine parts. Employees are graded according to their distance and near vision, and on the degree of muscle balance of the eyes. Employees who have phorias (exo or esophorias) greater than five prism dioptres are not put on fine close work. The adoption of this procedure has been followed by very satisfactory results. Only a very small number of workers, about 2 per cent., have complained and asked to be transferred to another section of the factory where such fine close work is not necessary.

Recent research in binocular vision has shown that not only phorias but also poor stereoscopic vision may often be responsible for symptoms of eyestrain. The conclusions reached in " A Study of a Selected Group of Women Employed on Extremely Fine Work" (Ida Mann and Dorothy Archibald) are that to be able to continue fine close work without fatigue one should have a well developed stereoscopic sense and good muscle balance for the near point. As a general guide one could recommend that employees engaged in very fine close work should not have hyperphoria. The exophoria or esophoria must not be greater than five prism dioptres. They should have good stereoscopic vision in addition to a corrected visual acuity of 6/6 or 6/9 in each eye. It is interesting to note that one-eyed workers with 6/6 vision in the good eye can continue working comfortably in occupations involving fine close work. Such careful selection of workers for fine close work should be done in factories, training and rehabilitation centres, by ophthalmic surgeons who should have the assistance of an orthoptist who might carry out treatment of individuals with small degrees of muscle imbalance and poor stereoscopic vision but who are otherwise fit and willing to do such work.

Myopia.—The ophthalmic surgeon is often asked by myopes and parents of short-sighted adolescents whether it is safe for them to carry on with clerical work or any other type of close work.

There is no evidence that close work has any effect on the progress of myopia. In the past ophthalmologists held the view that close work caused a deterioration of the sight of myopes (a progression of myopia). Recent investigations have not confirmed this opinion. Myopes whose vision with glasses is 6/6 or 6/9 each eye can carry on comfortably with fine close work (needlework, weaving, etc.). Myopes with 6/12 vision in each eye are fit for all types of clerical work. Adolescents suffering from myopia, whose corrected vision is less than 6/9 in each eye at the age of 16, should be advised against taking up close work, as with the natural progress of myopia between the ages of 16 and 25 there is a likelihood of their vision further deteriorating. At the age of 21 they might have 6/18 vision only and find themselves unable to carry on with clerical work or any other type of close work with comfort. The selection of a suitable job by a high myope in adolescence will obviate many years of wasted training.

Latent hypermetropia.—The Railway companies insist that employees who are training as firemen and later as engine drivers, should have, on entering their service, 6/6 vision in each eye without glasses. Many young men with a latent hypermetropia of 2 or 3 dioptres have 6/6 vision each eye without glasses and pass the necessary eyesight tests required by the Railway companies. At the age of 40 their latent hypermetropia becomes manifest and their vision without glasses drops to 6/18. When re-examined at this age their vision is below the required standards without glasses, although their vision with glasses is 6/6 in each eye.

These men are refused promotion from firemen to acting drivers and are given lower grade jobs with loss of wages. The same applies to drivers of public vehicles who are not allowed to go on driving. They have wasted many valuable years in training for a high grade job and at middle age are refused promotion. This could have been prevented had an ophthalmologist examined their eyes before they had taken up employment. The railways and other public transport companies should not employ men who are to be trained as drivers if their latent hypermetropia is 2 dioptres or over.

The selection of workers for suitable jobs is one of the great problems to be solved after this war. With the co-operation of the industrial medical officers, ophthalmologists, psychologists, and safety officers a great deal may be accomplished.

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ANNOTATIONS

An Error in Diagnosis

Border-line cases between two special departments in surgery are often intriguing. Some forty years ago, when the writer was house surgeon to the ophthalmic department, an elderly man was admitted for marked ectropion of the left upper lid. The lid was completely turned back upon itself and kept in this position by a tense band of tissue leading towards the inner end of the eyebrow where was a puckered scar attached to bone. The man said he had had abscesses in the forehead for years and had been treated in out-patients. His out-patient book was found, from which it appeared that twenty or more years previously he had been under treatment by one of the surgeons and the diagnosis made at the time was gumma of the skull. Much iodide of potash had run down his throat since. The ophthalmic surgeon incised the puckered scar, freed the lid which resumed its proper place, and the man was discharged soon after. Some months later, when we were house surgeon to the hospital, this man was re-admitted with ectropion as before. He was referred to our surgeon who was inclined to consider the primary cause as a gumma of the skull. We had no idea what made us offer an opinion unless it was that the surgeon asked what we thought; but, looking at the site of the puckered scar it occurred to us that his trouble might all the time have been in the frontal sinus and we suggested a reference to the nose and throat surgeon. This was done and old standing disease was found in the sinus. The man was treated surgically and some saving in the expenditure of iodide of potash was made. It seems odd that such a prolonged history of chronic disease should have persisted without a proper nasal examination. But the error of repeating a medicine, which may do good and cannot do much harm, is an easy one to fall into in out-patient practice. Also the house surgeon must know his chief and his foibles pretty well before he

starts diagnosing his cases for him. Some elders do not take at all kindly to receiving suggestions from so insignificant a person as a house surgeon. Brilliant careers have in the past been much delayed by a man in the position of a house surgeon being too fond of advising his chief as to diagnosis and treatment. It should be possible with tact to suggest an obvious line of examination in such a case without treading on elderly toes. But house surgeons should beware.

Overwork

It was recently announced in the lay press that a certain eminent gentleman from overseas had "disclosed . . . that he had become totally blind. While his general health was perfect, he said, 70 years of overwork had brought a paralysis of his optic nerve." His age was given as 83.

While refraining from commenting on the meaning, if any, of the phrase "70 years of overwork," it is pertinent to comment on the question of damaging any organ of the body by use. So often one hears of visual defects brought on by excessive use of the eyes, by working under artificial light, by reading in bed—the list is limitless. The writer has yet to be convinced that any healthy organ has ever been permanently damaged by work or overwork; nature has her own controls and it is not fanciful to conclude that function is interrupted before damage begins. In the field of cardiology, the sympathy so commonly extended to the hearts of men who have indulged in severe athletic strain has been proved to be misplaced. Reference to Bell's Life Tables has proved that the expectation of life of old rowing men is just a little above the average. One feels that it is high time that this old bogey of damage from use should be exorcised for ever. Perhaps the most important aspect of the question is the clinical; one is constantly hearing, for instance, of the patient with early cataract who has had cruel and totally unnecessary restrictions placed upon his visual activities. The writer cannot call to mind any ophthalmic condition, other than the inflammatory or immediately post-operative, which demands that such visual capacity as remains to the patient may not be exercised to the full. The burden of defective sight is hard enough to bear in itself; further voluntary restriction is psychologically unwise and physiologically unjustified, at least until the time comes when it is proved that use may cause further damage, and it will, in the writer's opinion, be a very long time before it is proved that work, or overwork, can induce pathological changes in a healthy organ—even the optic nerve.

ABSTRACTS

MISCELLANEOUS

(1) **Bruetsch, W. L. (Indianapolis).—Malaria therapy in syphilitic primary optic atrophy.** *Jl. Amer. Med. Assoc.*, January 5, p. 14, 1946.

(1) Good results in the control of syphilitic optic atrophy by malaria therapy are reported. These are explained on the basis that the degeneration of the optic nerves is due to an inflammatory process which is arrested by malaria therapy.

Routine treatment with trivalent arsphenamine, bismuth and mercury is entirely inefficaceous in syphilitic optic atrophy, and the patient will become blind almost as rapidly as if he had received no treatment at all. No clinical data or details of treatment are given.

A. F. MACCALLAN.

(2) **Vidal, F. and Malbran, J. L: (Buenos Aires).—Dynamic ophthalmotonus and retinal arterio-sclerosis.** *Arch. de Oftal. de Buenos Aires*, June, 1945.

(2) **Vidal** and **Malbran** suggest that in accordance with the theory that aqueous humour is a dialysate retinal arteriolo-sclerosis diminishes the blood supply and causes disturbance of ocular cellular metabolism thus leading to diminution of ophthalmotonus.

They make use of (1) neuro-artenular and neuro-capillary tests (2) ophthalmotonometer control (3) fundus examination (4) numerous anatomo-pathological examinations on leptomeningeal arterioles to classify cases of retinal angio-sclerosis according to predominance of lesions. Their classification is as follows:—(1) arteriolo-sclerosis. (2) phlebo-sclerosis. (3) mixed form. (4) capillarosis.

They further subdivide the first group into 3 sub-groups, *viz.*:—(1) arteriolar atheroma, *i.e.* subendothelial proliferation. (2) arteriolosclerosis, *i.e.*, sclerosis of middle coat. (3) mixed form—the most common.

FRANCIS J. DAMATO.

(3) **Vidal, F. and Malbran, J. (Buenos Aires).—Chronic primary glaucoma and volume of globe.** *Arch. de Oftal. de Buenos Aires*, Vol. XX.

(3) **Vidal** and **Malbran** find that in chronic primary glaucoma the volume of the globe is decreased in 90·48 per cent. of cases. It is increased in hypertension due to various causes in 21 per cent., normal in 50 per cent. and decreased in 8·57 per cent.

They use Wintrobe's haematocrit and potassium orealate as an anticoagulant.

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(4) **Pereira, R. and Tolosa, E.—A dacryo-sinusitis simulating dacryo-canaliculitis.** *Arch. de Oftal. de Buenos Aires*, July-August, 1945.

(4) **Pereira and Tolosa** describe a case of continuous suppuration in the conjunctival sac of the right eye coming from the superior lacrimal canaliculus. The lower lacrimal canaliculus and lacrimal sac were patent. Probing of the superior lacrimal canaliculus with Bowman's probe, controlled by radiographic examination revealed a dacryo-ethmoidal fistula. Examination of the nasal sinuses showed a sinusitis of the ethmoid and maxillary antrum. Treatment of the sinusitis was followed by disappearance of the pus and closure of the fistula.

FRANCIS J. DAMATO.

BOOK NOTICES

Optique physiologique. By YVES LE GRAND, Sous-Directeur du Laboratoire de Physique, Paris; with a preface by Charles Fabry, Membre de l'Institut. Tome I—La Dioptrique de l'Oeil et sa Correction. Pp. 356. Editions de la "Revue d'Optique," Paris. 1946. Price, 250 francs.

As Professor Fabry says in his preface, it is an enterprise "singulièrement hardie," in the present state of science and technology, to write a comprehensive treatise on physiological optics. M. Yves le Grand's work will be in three volumes, of which the first, now under consideration, deals with the dioptrics of the eye and its correction. Vol. II will treat of visual sensations of light and colour; and Vol. III of vision of details (visual acuity), movements, and relief. Even this programme does not embrace the whole of physiological optics as exemplified in the classic treatise of Helmholtz; and it is indeed probable that this great work could be satisfactorily brought up to date only by the combined efforts of a carefully selected team of experts. In the meantime it may be said at once M. Le Grand's first volume adequately fulfils the requirements for the section on ocular dioptrics and its correction as long as one confines oneself to Gauss's approximation, *i.e.*, to rays of light near the axis of homocentric lens systems. These are the laws of optics with which the student of ophthalmology is familiar, and the mathematics involved is of an elementary character. M. Le Grand has confined himself to the simplest possible mathematical developments, and most of those found in this volume should be easily understood. Both Prof. Fabry and the author are indeed caustic critics of Gullstrand's appendices to the third edition of Helmholtz's work. The former says that he

"semble y avoir accumulé, comme à plaisir, les difficultés mathematiques"; and M. Le Grand says "autant la redaction originale de Helmholtz se lit avec un plaisir toujours neuf, autant la mise au point de Gullstrand, bien que plus jeune d'un demi-siècle, a vieilli davantage et est d'une lecture indigeste sous son apparence de rigueur." Even if the ophthalmologist shrinks from the simple mathematics of this book he is strongly advised to read it and take note of the deductions.

Section A, on the eye at rest, is an excellent account of the dimensions of the eye, curvatures of surfaces, etc., and the formation of the images of objects by the eye. Whilst Gauss's approximation is satisfactory up to a point, even when the images of the ametropic eye are corrected by glasses, the author is right in emphasizing the fact that it does not suffice to explain the distribution of light on the retinal images, which depends on aberrations and diffraction effects not dealt with in this volume.

Accommodation and its theories, including that of Fincham, are described; and the effects of correcting lenses fully explained on the familiar lines. The mathematical deductions, however, reveal many minutiæ, some of considerable importance, which are frequently ignored, *e.g.*, the form of the correcting lens, whether biconvex, meniscus, periscopic, or punctal. These are more numerous and important when dealing with the eye in movement (Section B). when there is some deviation of the line of fixation. Thus, even with a spherical lens, deviation produces prismatic and oblique astigmatic effects, resulting in displacement and alteration of size and shape of the image. Hence the frequent complaints on first wearing the glasses. It is possible to produce anastigmatic thin lenses; these are menisci with the concavity towards the eye. Two such types, those of Ostwalt and of Wollaston, fulfil the requirements. Ostwalt's calculations were incorrect (no mention is made of Percival's): they have been corrected by Tscherning. Biconvex and biconcave glasses are the worst; plano-concave and plano-convex, periscopic, and demi-coquilles progressively better; and Ostwalt's (easier to manufacture than Wollaston's) best. A −20 D plano-concave lens, with the concave face towards the eye, eliminates oblique astigmatism completely, even if the lens is thick, since the centre of curvature of this face coincides with the centre of rotation of the eye. There are many other points of interest which merit the attention of the student.

Section C deals with binocular vision—heterophoria, anisometropia, aniseiconia, etc. Section D, methods of examination, is the least satisfactory; it lacks the experience of the ophthalmologist. There is a short bibliography, but frequent references in the text are not notified precisely.

M. Le Grand's students at the Institut d'Optique are chiefly

opticians and future manufacturers of optical instruments; and it is for such that the book has been primarily intended. Though it is not necessary for the ophthalmologist to know all about the manufacture of lenses, it is most desirable that he should be fully *au fait* with theories which govern their use.

Refraction of the Eye. By ALFRED COWAN, M.D. Second edition, pp. 278. 181 Engravings, 3 Coloured Plates. London: Henry Kimpton. Price, 24/- net.

The author of this admirable book, the first edition of which was published in 1938, has based it on the experience gained in 20 years of teaching in the University of Pennsylvania. This is evident in the first five chapters, which consist of elementary optics, with full details of experiments to be made in the laboratory—experiments which most readers will probably have made in their school days. As they may have forgotten them, however, it is convenient to have them re-described.

The succeeding five chapters deal in considerable detail with the qualities of lenses, and are well worth perusal by those who take more than a superficial interest in the optical interpretation of their prescriptions. How many ophthalmic surgeons, for example, know what is meant by the sine condition, what are the disadvantages of using flint glass of high refractive index, and the possibility of overcoming chromatic aberration in fused bifocals?

The next three chapters deal with the optics of the eye, and here again, much valuable information is to be gleaned. To take only one example, there is an explanation of why physiological muscae become less evident when ametropia is corrected, and an experiment is described to show this.

The remainder of the book deals with ametropia, its signs, symptoms, investigation and treatment, and a final chapter with contact lenses and telescopic spectacles. As would be expected, these matters are treated in considerable detail, and, in addition to the ordinary methods of investigation, the reader is told how to carry out procedures such as dynamic retinoscopy, velanosciascopy, etc.

Where there is so much excellence, it may seem invidious to criticise, but these three points occurred to the reviewer as worthy of mention.

1. Although a full account is given of cycloplegia, no mention is made of oily homatropine and cocaine.

2. In describing the technique for the cross-cylinder, the user is not warned against the dangers of fogging.

3. It is suggested that, before carrying out a refraction, the strength of the patient's previous glasses should be known. On general principles, however, it would seem better to start without knowing this, and so be unbiassed in one's conclusions.

There is little doubt that Cowan's "Refraction of the Eye" will attain the popularity it deserves in this country, because, in addition to being readable, well produced, and adequately illustrated, it constitutes a most useful reference book.

A Text-book of Ophthalmology. By SANFORD R. GIFFORD, M.A., F.A.C.S. Third edition. 470 pp., 260 illustrations, including 43 in colour. W. B. Saunders Company, Limited, London and Philadelphia. 20/-

That this remarkable text-book has reached its third edition is a tribute to its worth and its appreciation by medical practitioners and students. This edition was completed before the author's death, and the revision of this work shows his characteristic thoroughness and care.

New sections have been added about ptosis, contact lenses, cyclodiathermy and epidermic keratoconjunctivitis. The text is well balanced in its treatment of the commoner eye diseases and has been brought up-to-date.

The illustrations, many of which are photographs, are excellent and give the student a vivid picture of disease processes affecting the eye. This book is especially valuable for general practitioners, house surgeons and students. Its production is of a high standard.

CORRESPONDENCE

LATERAL ORBITOTOMY (Krönlein)

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIRS,—This operation is so rarely performed, that the difficulties encountered in so few as six cases have prompted me to add to this correspondence. I hope to publish these with other cases in detail later.

Cases 1 and 2.—In both cases I found that a Hey's saw made little impression on the orbital margin, and that I could not thread a Gigli saw through the infraorbital fissure. This was due to the awkward angle of approach, the uselessness of the ordinary Gigli saw guide, and obscuring haemorrhage.

I repeated the operation on the cadaver and found that absence of haemorrhage made little difference, the chief difficulty being due to the temporal muscle, and its malar attachment.

It should be noted that Stallard departs from the classical procedure in this respect, detaching the muscle completely from the the bone, thus obtaining much better access without the necrosis anticipated by earlier authors.

As I had performed over 150 mastoid operations prior to that time, I expected it would not be too difficult to complete the bony sections by chisel, but in each case and also in the cadaver, I found that the hard bone splintered so easily, that access was only possible by reducing the outer orbital wall, and rounding the edges by Rongeur forceps. As in both cases an infiltrating tumour necessitated exenteration, the cosmetic aspect proved ultimately unimportant.

Case 3.—Professor Loewenstein was kind enough to demonstrate to the Leeds Infirmary ophthalmic staff, the division of the orbital margin in two places by Albee electric circular saw, and completion of the section by a small mastoid chisel.

This type of saw he indicated does not cut as deeply as the electric chain-saw, and is therefore not quite as effective.

I also observed while assisting, that the spray of blood from the saw edge makes it difficult to watch the cut closely, and that extemporised retractors (like flat tongue depressors) made retention of swollen orbital tissues an awkward task. An orbital angioma 33 × 28 × 23 mm. was removed with excellent cosmetic result. The operation in 4,506 cases were performed by the same technique.

Case 4.—I assisted my colleague on the infirmary staff the next day to use an identical technique. In this case also a smaller non-malignant orbital tumour was removed successfully.

Case 5.—I found in this case where the orbit contained a very large angioma, 36 × 30 × 28 mm., that Axenfeld's (plates) orbital retractors (Down Bros., catalogue of ophthalmic instruments, 1930, p. 733, Nos. 733, 7 and 8), still did not give as good an access as I wished, and therefore had a spade-shaped retractor, 3 cm. wide by 5 cm. long made by Thackrays of Leeds. The prototype of this is illustrated in Operative Ophthalmology (Haab), Philadelphia, 1905, p. 285, No. 113. The flat surface was curved in this new design.

I also found that the small angulated chisel made by Thackrays to the design illustrated in Ophthalmic Surgery, Meller, 3rd edition, 1923, p. 171, Fig. 112, was very sharp, and cut better than the blunter mastoid chisel, but that the point was obscured by the holding fingers in use. This tumour was also successfully removed, but a total ophthalmoplegia followed which is now recovering.

Case 6.—A tumour of the lacrymal gland was removed successfully. The retractor worked well during the sawcut, but I still found it difficult to observe the point of the chisel at the moment of striking, and I have accordingly designed a metal chisel holder which I hope will permit a better view while chiselling in future. The bony fragment in this case could not be held in good apposition, nevertheless the cosmetic result was quite good.

Most of the orbital tumours I have seen could be removed without bony resection, and were quite clearly in the ophthalmologist's

exclusive province; a minority were extensions of intracranial tumours, or could be determined pre-operatively to have intracranial extensions and obviously were not.

For the remainder I feel with previous correspondents that lack of ophthalmic enterprise has led the neuro-surgeons to place their claims too high, and would suggest that the transfrontal approach for purposes of diagnosis or tumour removal is only indicated where the tumour interferes with the function of the optic nerve (not the macula), and is probably situated at the orbital apex, or far back on the inner side.

As the general surgeon is not so careful about the condition of instruments as ourselves, I have found it advisable to inspect those borrowed two or three weeks before operation, so that they can be put in order in time.

Yours faithfully,

JOHN FOSTER.

LEEDS.

OBITUARY

ANDREW MAITLAND RAMSAY, 1859-1946

ANDREW MAITLAND RAMSAY died at St. Andrews on March 20, 1946, in his eighty-seventh year. He was born in Glasgow on November 9, 1859, and was educated at Linlithgow Burgh Grammar School and the University of Glasgow. He was a great clinical ophthalmologist after the manner of William Mackenzie in whose steps he walked and whom he greatly admired. In 1882 he graduated M.B., C.M., and obtained the higher qualifications of M.D. and F.R.F.P.S. during the next ten years. Later he became an LL.D. (*honoris causa*) of his old University and a Fellow of the Royal Society of Edinburgh. His early graduate experience was obtained in the Western Infirmary, Glasgow, and in the Glasgow Eye Infirmary. There he came under the influence of Gavin Tennent, and Thomas Reid. His experience was enlarged by a period in general practice prior to his devoting himself to his chosen speciality. Throughout his long life he retained an admiration and devotion to his early teachers in the ancient University and in his turn added to the clinical traditions which he admired so much.

In the wider field of British Medicine he had many personal friends particularly Osler and James Mackenzie. The main belief of these great clinical obervers that laboratory work of all kinds must take second place to the patient received wholehearted support

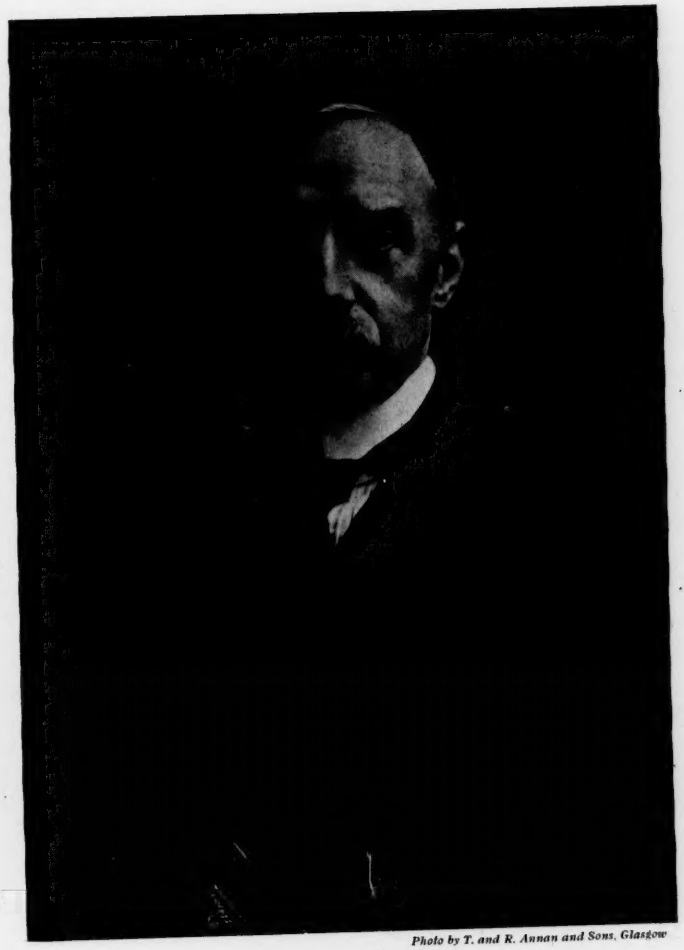

Photo by T. and R. Annan and Sons, Glasgow

ANDREW MAITLAND RAMSAY

UNIV. OF MICH.

from Ramsay. He was a sturdy individualist and with certain forms of modern research he had little sympathy, believing that the out-patient department and the bedside must be the centre of enquiry to which every other interest must be subordinated.

He was a man of varied interests and tireless activity all his days. During his early clinical years at the Charlotte Street Dispensary of the Glasgow Eye Infirmary he collected material for his Atlas of External Diseases of the Eye which was published in 1897. This is still a standard work and the beautiful plates retain their freshness and value to this day. Photographs, drawings, lantern slides and teaching apparatus of all kinds were of life-long interest to him and he was an inveterate collector of clinical data beautifully illustrated with material from his experience. In 1898 he was appointed Surgeon to the Ophthalmic Institution, the Eye Department of the Glasgow Royal Infirmary. The Ophthalmic Institution was founded by J. R. Wolfe, who practiced ophthalmology for many years in Glasgow and whose name has been known to generations of surgeons in relation to skin-grafting. The building was an old one and Ramsay had the great hope that it would be re-built and closely integrated with the work of the Royal Infirmary and the medical wards which he loved so much. This hope was not fulfilled, however, and the old building is still in use. In it he inaugurated post-graduate activities of a varied character, particularly lectures to physicians and general practitioners. These courses were attended enthusiastically and he took the greatest pains in the preparation and delivery of each lecture. Many have been published in the various medical periodicals and the most valued were reprinted in book form.

During the 1914-1918 war he served as a Major, R.A.M.C. (T.), being attached to the 3rd Scottish General Hospital as ophthalmic surgeon. It was at this time that under the will of his old friend and teacher, Gavin Tennent, the University of Glasgow received a bequest for the foundation of a Chair in Ophthalmology. The subject had received academic recognition as far back as 1828 when William Mackenzie was appointed Lecturer in Ophthalmology; he died in 1869 and was succeeded by Thomas Reid, who was followed by Ramsay. The tragedy of war and the subsequent difficulty in building prevented the fulfilment of the project for over twenty years. He lived to see his successor as Lecturer installed as the first occupant of the Chair in 1936. Within three years of its foundation the world was plunged into the second war.

Many honours and distinctions were conferred upon Ramsay throughout his long life. He was President of the Ophthalmological Society of the United Kingdom in 1922 and of the Ophthalmological Section of the British Medical Association at its meeting in Bradford. He was the first recipient of the William Mackenzie

Medal and was a President of the Glasgow Royal Medico-Chirurgical Society. He retired from active hospital work at the age of sixty and went to live in St. Andrews. His enthusiasm for clinical activities of all kinds found fitting expression in his devotion to the Mackenzie Institute for Clinical Research which had been founded by his friend, Sir James Mackenzie in St. Andrews. The published reports of the Institute bear witness to the thought and energy which Ramsay put into a project which had such a close parallel in clinical medicine to his own ideals in clinical ophthalmology. Both the Tennent Institute and the Mackenzie Institute had to curtail their activities in 1939 but fortunately neither suffered great material damage. The Charlotte Street clinic where Ramsay worked so hard as a young man was destroyed by enemy action.

From his beautiful home in St. Andrews he retained his ophthalmological contacts and interests to the end. He was in correspondence with many friends and colleagues throughout the world, and the hospitality of Dr. and Mrs. Maitland Ramsay was a feature of the most academic town in Scotland. He was always pleased to hear of fresh activities in the world of ophthalmology and was delighted to yarn by the fireside on the events of the past and the plans for the future. The trend of modern medicine was in general distasteful to him. He feared the bureaucrat and the organiser of clinical work. Anything which was in the least likely to interfere with the personal relationship between the patient and a trusted medical adviser was anathema to him, and rightly so. Patients loved him and he gave himself wholeheartedly to their service; even after his retirement from active practice in Glasgow, many made the journey to St. Andrews to consult with one of ripe wisdom and wide culture. The charm and geniality of his manner will long be remembered by the generation of students whom he trained; the generations to come will read the papers of a great clinical observer with benefit and understanding. He applied in his practice the best that is known in our art and maintained throughout his long life an enthusiasm for ophthalmology that has been an inspiration to his younger colleagues.

JOHN ALEXANDER PRINGLE

JOHN ALEXANDER PRINGLE, Hon. Ophthalmic Surgeon to the Kent and Canterbury Hospital, who died at Epsom on February 12, was born in Ireland, Co. Tyrone, in 1882, and was educated at Coleraine Academy, at the Royal Academy, Belfast, and at Trinity College, Dublin. He graduated in medicine in 1905, and proceeded M.D. of Dublin University in 1908 after holding house appointments in Dublin and at the Bristol Eye Hospital. Coming to London he worked as chief assistant at Moorfields and senior

ophthalmic assistant at St. Mary's Hospital, and later settled at Canterbury. During the war of 1914-1918 he was officer in charge of the ophthalmic centre at Rouen, and then ophthalmic surgeon to the 4th Army, B.E.F., and afterwards held the same post in the British Army of the Rhine. On returning to civil life he became eye surgeon to the Ministry of Pensions for the Canterbury District and to the local education authority; he was also consulting ophthalmic surgeon to the Herne Bay Hospital and to Princess Mary's Hospital for Children at Margate.

A colleague writes:—

"He was a keen and careful oculist, a good surgeon and clinician and popular with his patients. He started practice in Canterbury in 1922, and soon worked up a large practice extending over the East Kent area. As regards sport, he was fond of shooting and was a useful golfer, and a member of the Medical Golfing Society. He spent many holidays abroad.

He retired from practice in 1940 on account of heart trouble, from which he never really recovered and he lived quietly in Cornwall during the war years."

NOTES

Faculty of Ophthalmologists

As the result of a ballot the new Council of the Faculty of Ophthalmologists, which consists of National and Regional Representatives, has now been elected as follows:—

Regions	*Members*	*Full-time Associates*
1	E. G. Mackie	A. C. Reid
2	P. Jameson Evans	R. S. MacLatchy
3	J. J. Healy	W. Simpson
4	Sir Stewart Duke-Elder	Stewart Macky
5	J. P. Spencer Walker	A. N. Fergus
6	W. J. B. Riddell	P. M. Wood

National Representatives (Members)

George Black; R. C. Davenport; J. H. Doggart; P. G. Doyne; O. M. Duthie; C. B. Goulden; F. A. Juler; Frank W. Law; T. Keith Lyle; Ida Mann; H. M. Traquair; David Wilson.

Part-time Associate

C. M. Stevenson.

The Annual General Meeting will be held at the Royal Society of Medicine, 1 Wimpole Street, London, W.1, on Saturday, June 1, at 2.30 p.m. Notices will be sent to each Member and Associate of the Faculty, together with a copy of the Annual Report.

The Ophthalmological Society of Australia

THE next meeting will be held at Melbourne, October 23-26, 1946. The President is Dr. J. Ringland Anderson. Overseas ophthalmologists are cordially invited.

* * * *

Oxford Ophthalmological Congress, 32nd Annual Meeting

A MEETING of the Oxford Ophthalmological Congress has been arranged for Thursday, Friday and Saturday, July 4, 5 and 6, 1946, at the Department of Human Anatomy, Oxford, by kind permission of Professor Le Gros Clark.

Accommodation has been secured at Keble College, and the Warden has kindly agreed to include lady members as residents in College. Members will meet informally at supper on Wednesday, July 3, at 7.45 p.m., in the Hall of Keble.

The Congress will open with a discussion on "Amblyopia," which will be led by Mr. Philip Jameson-Evans, and Mrs. Dorothy Campbell.

The Doyne Memorial Lecture will be delivered by Professor Arthur J. Ballantyne and will be entitled "The State of the Retina in Diabetes Mellitus."

Facilities will be provided in the Museum for demonstrations, and members are invited to bring forward cases, specimens, instruments, apparatus, etc., of ophthalmological interest.

The council has decided that orthoptists shall be granted the privilege of attending the congress as visitors, on the invitation of a member, at sessions in which subjects affecting their department are to be discussed.

Visitors may only be introduced if sponsored and paid for by a member, after formal application to the honorary secretary and after sanction has been granted by the council.

The full programme of the Congress will be issued in June to all members in Great Britain and Ireland and to such members overseas as request it.

Subscriptions should not be sent until the full programme is received.

* * * *

Retirement

MR. R. J. ELCOCK, who has been head of the receiving and order office at 24, Thayer Street for many years, retired at Easter, 1946. He was a familiar figure to all who called on business connected with the Journal, and a very large amount of our material must have passed through his hands. In thanking him for his work for us we wish him health and happiness in his retirement.

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Corrigendum

WE regret that on p. 249, line 27, in the April number there is an error. For Pollitzer read Politzer.

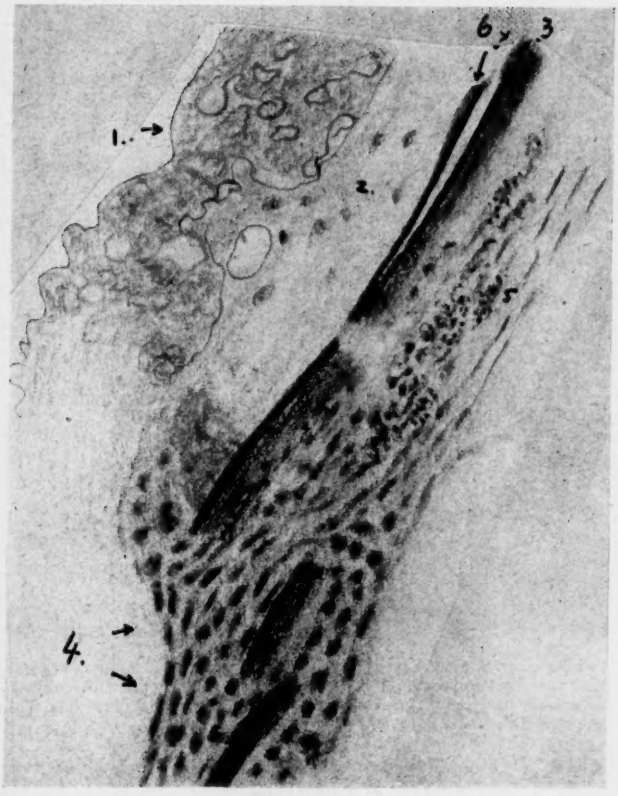

FIG. 1.

Band-shaped corneal degeneration. Haem. Eos. 300×. 1. Acidophil amorphous mass. 2. Pinkish fluid. 3. Calcified Bowman's membrane. 4. Epithelium growing between gaps of broken Bowman's membrane. 5. Lime powder in corneal lamellae. 6. Acidophil structureless substance.

FIG. 2.

Band-shaped corneal degeneration. 300×. Mallory. Note:—1. Dark blue calcified Bowman's membrane broken up. 2. Intensive acidophil substance in front of Bowman's membrane between epithelial cells (stained differently from orange red blood corpuscles).

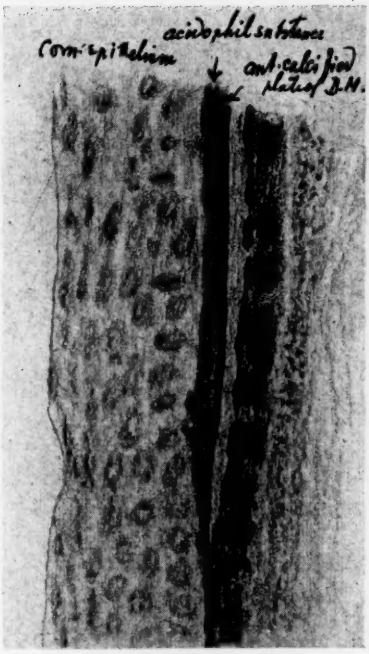

FIG. 3.

Band-shaped corneal degeneration. 300×. H.E. Note:—1. Acidophil granular substance in front of Bowman's membrane. 2. Parallel splitting of Bowman's membrane. 3. Unequal distribution of lime in main mass of Bowman's membrane.

FIG 4.

Band-shaped corneal degeneration. 300×. H.E. Note:—subepithelial connective tissue. Epithelium thinned.

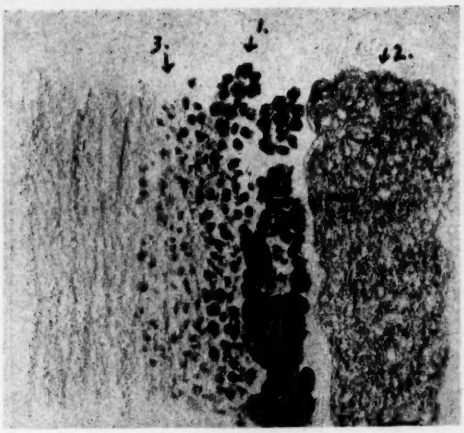

FIG. 5

Band-shaped corneal degeneration. von Kossa's reaction. 1. Lime granules brownish-black. 2. Acidophil substance safranin red. 3. Red granules between calcium positive masses.

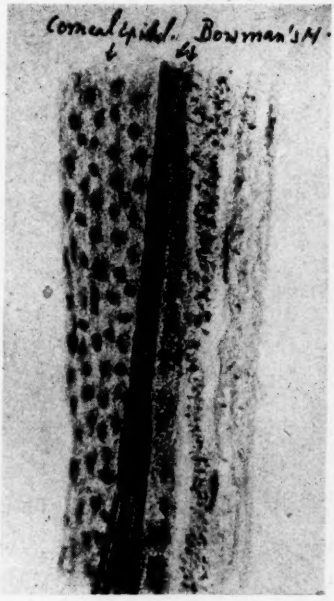

FIG. 6.

Band-shaped corneal degeneration. 300×. Gel. H.E. Note:—1. Anterior part of Bowman's membrane split into 5 layers. 2. Posterior 3/4 more granular. 3. Anterior lamellae are purplish powdered.

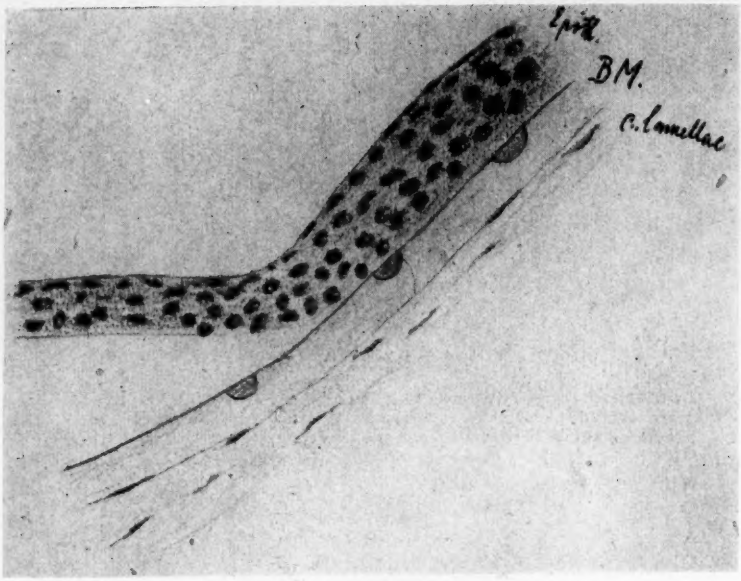

FIG. 7.

Secondary glaucoma H.E. 300×. Hemispherical bodies—subepithelial oedema.

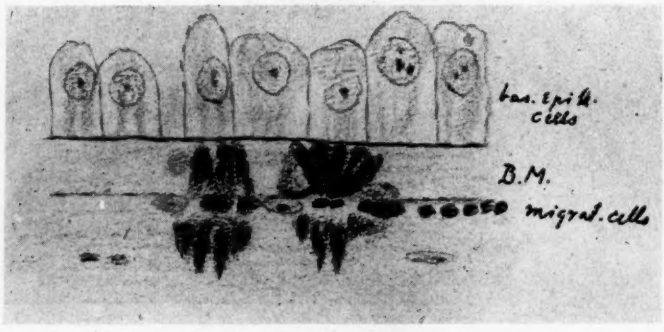

FIG. 8.

Concretions in Bowman's membrane of ragged shape in a hypertensive senile eye. Haem. Eos. 675×.

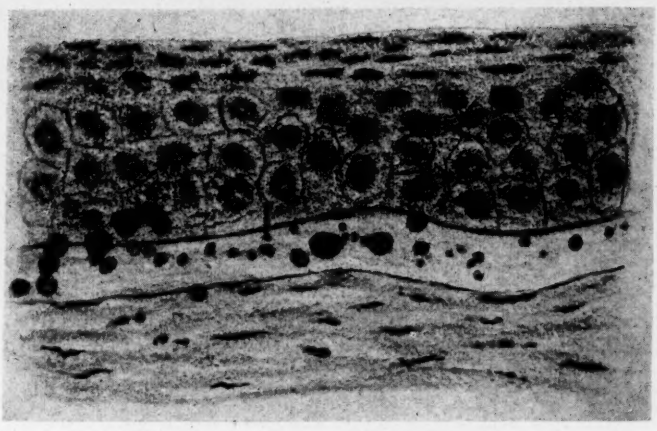

FIG. 9.

Concretions in Bowman's membrane and basal epithelial cells in a hypertensive senile eye. Haem. Eos. 675×. Note:—Most of the concretions are purplish, some of them have an orange appearance.

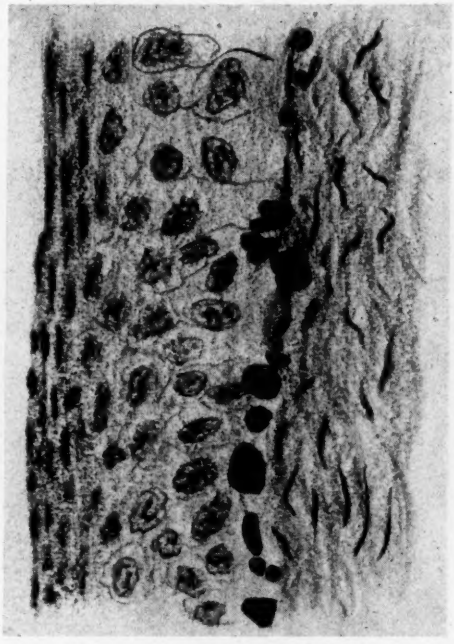

FIG. 10.

Concretions in scleral conjunctiva. H.E. 600×. Most of them are in basal cells towards sclera. They are embedded in sclera as well.

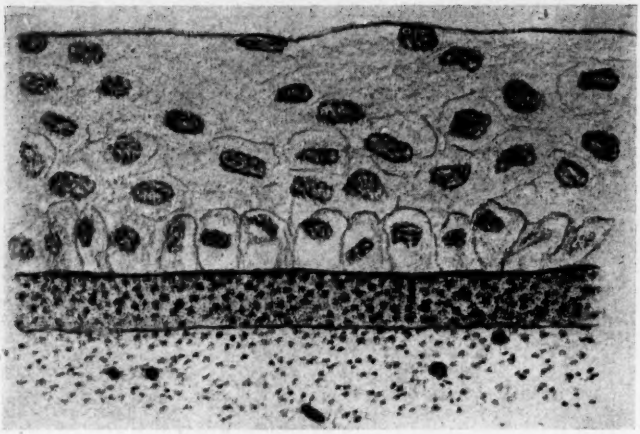

FIG. 11.

Corneal opacity 27 years after mustard gas injury of both eyes. H.E. Oil immersion. 675×. Bowman's membrane full of purplish granules. Epithelium free. Corneal lamellae powdered.

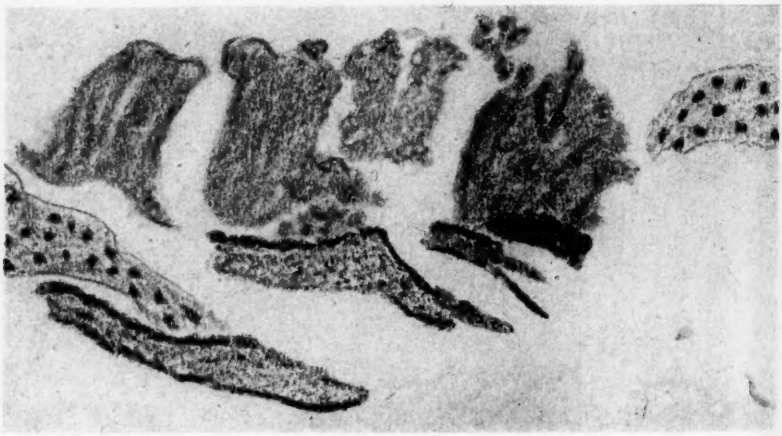

FIG. 12.

Corneal opacity 27 years after mustard gas injury. H.E. 300×. Note:—Eosinophil mass in front of Bowman's membrane. 2. Bowman's membrane broken. 3. No epithelium preserved.